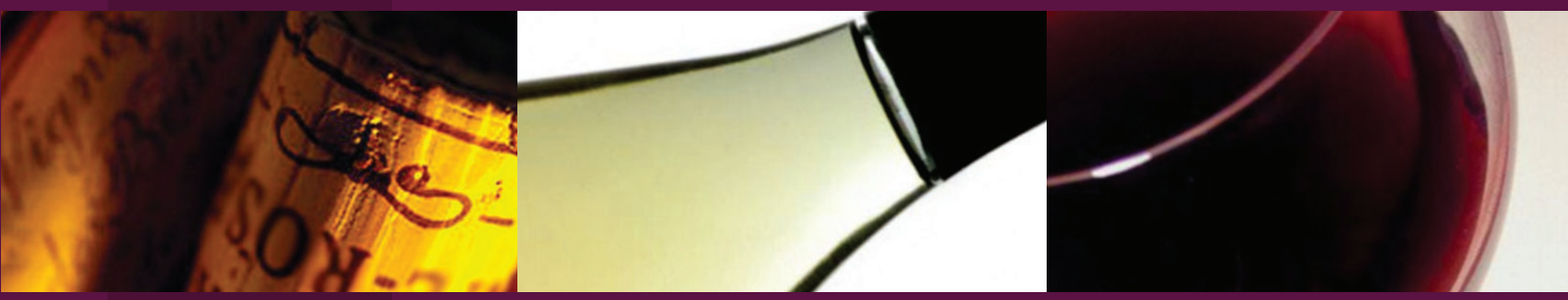
WEP

Wine Economics and Policy



Production and hosting by
FIRENZE UNIVERSITY PRESS

Volume 13 Issue 1 june 2024 ISSN 2213-3968

Wine Economics and Policy

Volume 13, Issue 1 – 2024

Firenze University Press

Wine Economics and Policy is an international, peer reviewed and open access journal published by UniCeSV – Centre for the Strategic Development of the Wine Sector, University of Florence.
The mission of the journal is to provide an environment for academic researchers and business professionals around the world to work together in the fields of wine economics and policy in order to deal with the current and future issues of the wine sector.

Contacts:
Scientific Manager:
Veronica Alampi Sottini
email: wepjournal@fup.unifi.it
Department of Agriculture, Food, Environment and Forestry (DAGRI) – University of Florence
P.le delle Cascine, 18 – 50144 Florence (I)

Editor in-Chief
Nicola Marinelli,
email: nicola.marinelli@unifi.it
Department of Agriculture, Food, Environment and Forestry (DAGRI) – University of Florence
P.le delle Cascine, 18 – 50144 Florence (I)

Published by
Firenze University Press – University of Florence, Italy
Via Cittadella, 7 – 50144 Florence – Italy
http://www.fupress.com/wep

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Dias, A., Sousa, B., Santos, V., Ramos, P., & Madeira, A. (2024). Determinants of brand love in wine tourism. *Wine Economics and Policy* 13(1): 3-15. doi: 10.36253/wep-13855

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Determinants of brand love in wine tourism

Alvaro Dias[1,*], Bruno Sousa[2], Vasco Santos[3], Paulo Ramos[4], Arlindo Madeira[5]

[1] *Business Research Unit and ISCTE—Instituto Universitário de Lisboa, Av. das Forças Armadas, 1649-026 Lisbon, Portugal*
[2] *IPCA-Polytechnic Institute of Cávado and Ave, Barcelos, Portugal and CiTUR—Centre for Tourism Research, Development and Innovation, Polytechnic of Leiria, 2411-901 Leiria, Portugal*
[3] *GOVCOPP of Aveiro University, 3810-193 Aveiro, ISLA Santarém, 2000-241 Santarém Portugal and CiTUR—Centre for Tourism Research, Development and Innovation, Polytechnic of Leiria, 2411-901 Leiria, Portugal*
[4] *CBQF School of Biotechnology of the Portuguese Catholic University, and COMEGI of Universidade Lusíada do Porto, 4100-346, Porto, Portugal*
[5] *CETRAD- Centre for Trandisciplinary Studies, University of Trás-os-Montes and Alto Douro, Quinta dos Prados, 5000-801 Vila Real, Portugal; ESCAD- High School of Administration Sciences of IPLUSO - Polytechnic Institite of Lusofonia, Campo Grande 400, 1700-098 Lisbon, Portugal; Tourism and Hospitality school, Europeia University, Quinta do Bom Nome, Estrada da Correia 53, 1500-210 Lisbon, Portugal*
E-mail: alvaro.dias@iscte-iul.pt; bsousa@ipca.pt; vasco-rs@hotmail.com; pramos@por.ulusiada.pt; arlindo.madeira@universidadeeuropeia.pt
*Corresponding author.

Abstract. Wine tourism provides a multisensory experience through various wine tourism activities. It also adds value to the regions and their producers by enhancing the wine knowledge and sensory experience of the visitors. This study explores the determinants of brand love in wine tourism. Using survey data from wine tourists in Portugal, a structural equation modelling was performed to test the conceptual model. An Importance-performance matrix analysis was also used to obtain additional insights. The results show that the wine tourism enhances brand love. This implies that emotions (i.e., a sense of belonging) towards the overall location is associated with the satisfaction and the quality perception that the winery exhibits. Furthermore, although the consumer's active participation in wine tourism does not impact brand love directly, its influences occur through the mediating effect of the relation quality. From an interdisciplinary managerial perspective, the present study provides insights into tourism management (i.e., wine tourism) and marketing (i.e., brand management and consumer behaviour).

Keywords: active participation, place identity, place satisfaction, relation quality, wine tourism.

1. INTRODUCTION

Wine tourism has evolved in recent decades due to several factors, such as the increasing competitiveness between wine-producing destinations [1].

Wine tourists undoubtedly seek appealing, exclusive, and memorable wine sensory impressions in the wine tourism settings. Wine potentiates a combination of multisensory experiences when tourists engaged in a wine tourism activity. In this context, brand love is a recent marketing construct and its influence in some relevant marketing variables such as word-of-mouth and purchase decision making has been demonstrated [2]. Existing literature suggests that consumers have a long-shared history with brands they love ([3,4]). The importance of a brand for the consumer is reflected through in the time spent (e.g. consumption), enhancing, and improving the brand satisfaction and loyalty of customers and groups [5]. According to Aro et al. [4], a positive service experience has been observed to have an extremely important impact on the formation of brand love, as it often results in a feeling thankfulness and companionship [6]. Thus, customer service has a direct role in the formation of brand love because the quality of the interaction between consumer and employee affects the formation of brand love. In the specific case of this research brand is a broader identity since the controlled denomination also act as global brands and providers of genuineness [7] together with the visited winery brands and the perceived "brand" can differ in relation with the tasting experience place (i.e., in a specific winery or is a controlled denomination global tasting room, a wine fair, etc.). Although the concept of place in wine regions, even from a stakeholder point of view is still a debatable concept [8] the concept of place here is viewed in the broader perspective of the wine region.

This study aims to examine and to understand the determinants of brand love in wine tourism (specific tourism contexts). A questionnaire was completed by wine tourism visitors to measuring the following constructs: place satisfaction, place identity, brand love, relation quality and active participation. A structural equation modelling (SEM) was used to test the research hypotheses. Hence, there is an emerging need for advancing novel insights that follows this research, due to the fact the brand love within the context of wine tourism and experiences has been little analysed [9]. In addition, according to the Statista Index [10] score, relating to the main world destinations of wine tourism, Portugal takes the second position in this world Top-10. Moreover, wine tourism being recognise as a priority product for the Portugal's tourism economic development, projecting wine Tourism in Portugal positioned in the TOP-50 worldwide [11], strengthening the Portugal's tourism strategy, as well as the future long-term growth of its potential. The paper is structured as follows: firstly, an introduction; secondly, a theoretical background based on brand love; then the conceptual model and development of the hypotheses are proposed; this is followed by the methodology approach; then the results of the model assessment are given; and finally, the results, discussion and conclusions, including managerial implications, limitations, and future research directions, are presented.

2. LITERATURE REVIEW

2.1. Brand love

Brands have been extensively studied through measuring customer satisfaction (e.g., [12]) and brand loyalty (e.g., [13]). According to Aro et al. [4], brand love as a concept refers to the consumers' strong emotional attachment toward a brand. Referring to emotional bonds and attachment may sound more natural than expressing love toward brands [14]. However, brand love has been categorized as one of the dimensions of attachment, although sometimes it is also acknowledged as a separate concept [15]. Therefore, brand love can be regarded as deep emotional brand connections.

Based on literature review, Aro et al. [4] (p. 73) proposed a new definition for brand love is used in the current study: "the emotional attachment of a satisfied consumer toward a brand, which can be formed and become apparent in different ways for different persons, but which typically includes identification with a brand to some degree". Satisfaction and self-expression, referring to brands that do help shape consumers' identity, are evident in many studies (e.g., [16,17].

There are countless brands that can satisfy consumers' needs and desires. However, few can create an emotional and unique connection with satisfied consumers, known as brand love or brand passion [18,19]. Product brand love is considered antecedent and outcome of place love, as both are considered interrelated. [18]. Love and passion are at the core of strong brand relationships. These feelings are developed out of a combination of love for the place and love for the values associated with it [20]. People may not explicitly state that they love a destination, but they do exhibit emotions that can be understood in that way [18,4], such as expression of extreme happiness when arriving at a destination [21]. This reflects the fact that people experience brand love differently in respect to the same destination, and their relationship can change over time [18,4]. Brand image also causes emotional responses. Indeed, research has shown that it positively affects brand attachment [22] and brand love [18,23]. This study will examine the determinants of brand love in wine tourism.

2.2. Conceptual model and hypotheses

2.2.1. The active participation in wine tourism

Wine tourism offers visitors experiences in the context of each wine region, which has various attributes such as wineries, vineyards, landscape, heritage, and people [24]. These experiences can be more enriching if they cover the four dimensions of the 4Es model by Pine and Gilmore [25], which balance active and passive participation, absorption, and immersion [26]. The winescape, the interaction with the region and its people, and the visitor's participation influence the quality of the wine tourist experience [27,28]. Visitors who are passionate and knowledgeable about wine culture are more emotionally engaged and enthusiastic about the winescape and its activities [29,1]. This engagement leads to positive outcomes for the destination brand [30;31] and its wines [32,33] and wine sustainability awareness [33]. Therefore, destinations should design satisfactory experiences that create customer attachment to place-based brands [26]. Co-creation is a process that involves collaboration between organizations and participants to generate mutual benefits, influenced by brand love, relation quality, and place identity [34,35]. Wine tourism experiences should stimulate interactions with the region, its people, and other visitors, to create value and memorable experiences [36]. To achieve a holistic experience and collect higher memorabilia, it is essential to have high involvement and active participation between the wine tourist, the region, its culture, and the interaction with inhabitants and other tourists [37]. Based on this background, the following hypotheses are proposed:

H1a. Active participation is positively related to brand love
H1b. Active participation is positively related to place satisfaction
H1c. Active participation is positively related to relation quality
H1d. Relation quality mediates the relationship between active participation and brand love
H1e. Place satisfaction mediates the relationship between active participation and brand love

2.2.2. The role of the place identity

Place attachment or topophilia is the feeling of connection, commitment, and satisfaction that people or groups have with a certain place [38]. In tourism, place attachment has two dimensions: place dependence and place identity [9]. Place dependence is the functional bond between people and the places where they live and work [39]. Place identity is the symbolic and emotional bond that forms with a visited place [40,41]. This bond grows over time through the memories and emotions that people have about the place, and it requires at least one visit to start [42]. The experience (specific or general) can create emotions and sometimes a sense of belonging with a place, an experience, a region, a brand, or a local community [43]. Place identity in wine tourism has two aspects: physical and social [1]. People's and places' characteristics may affect how attached someone is to a place, which may lead to positive feelings and actions towards that place [44].

This research examines how brand love for a wine region is influenced by place attachment. Brand attachment is a key concept in the literature on consumer-brand relationships, and it assumes that wine consumers form emotional bonds with places and brands [45]. The strength of these bonds affects the wine consumer's commitment to the target of the relationship [46]. Place identity is the emotional bond that develops with a visited place, based on the memories and emotions that people have about the place [40,41]. This bond requires at least one visit to start, and it can create a sense of belonging with a place, an experience, a region, a brand, or a local community [42]. Place identity in wine tourism has two aspects: physical and social [1]. The physical aspect is the emotional connection with the landscape, the buildings, and the heritage [43]. The social aspect is the emotional connection that forms through social interaction with the local culture, the inhabitants, and other visitors [44].

Wine tourism is related to the concept of terroir, which defines the unique characteristics and combinations of the elements of each region (soil, topography, climate, methods of wine production and autochthones grape varieties) and its wines [8]. Countries and regions are perceived as brands, and appellations of origin are global brands that guarantee the authenticity and quality of the producing regions and their wines [9]. Some regions, their producers, and wines have achieved the status of loved brands because of their quality, winescape, culture, and history, and their position in the mind of the consumers [2]. Satisfaction and brand love are related concepts [2]. Consumers' positive experiences with services and products lead to satisfaction, which can lead to a long-term relationship of love for the brand [4]. Therefore, satisfaction with the regions, their wines, and their unique identity motivates wine lovers to visit them and reinforces their loyalty and love for the wine brands [34]. Wine Love brands/regions such as Bordeaux, Champagne or Douro have a strategic advantage, because their wines

and winescapes are of high quality and cannot be replicated elsewhere [42]. Thus, satisfaction with each wine characteristics is a powerful tool for creating wine brand love [8]. The hypotheses are as follows:

H2a. Place Identity is positively related to brand love
H2b. Place Identity is positively related to place satisfaction
H2c. Place Identity is positively related to relation quality
H2d. Relation quality mediates the relationship between place identity and brand love
H2e. Place satisfaction mediates the relationship between place identity and brand love

2.2.3. Determinants of brand love in a wine context

Wine is a product of culture and religion, revered by different civilizations and associated with deities like Dionysus (or Bachus). It has also inspired writers, poets, and painters throughout history, giving it a status of a loved brand [34]. Consumers' positive feelings towards brands create emotional reactions that can give companies a strategic edge over their competitors [4].

Wine lovers visit wine-producing regions and countries around the world for their passion for wine culture. Regions that produce more valuable wines have more fame among consumers, which strengthens their regional brand identity. The quality of the wine region is also affected by the authenticity of its winescape and the experiences it offers [41]. A wine region acts as an umbrella brand, which benefits the producers and wineries that are linked to a strong place brand [2]. Satisfaction and brand love are related but different concepts [17]. Satisfaction is a cognitive evaluation of an experience, while brand love is an emotion that leads to a long-term relationship with the brand [24]. A positive consumption experience stimulates arousal and pleasure, which can lead to delight and brand loyalty [42]. Wine brand love is developed through higher levels of satisfaction that result from meeting expectations and experiences over time [2]. Thus, the following hypotheses are proposed:

H3. Place Satisfaction is positively related to brand love
H4. Relation Quality is positively related to brand love

The hypothesized relationships are depicted in figure 1.

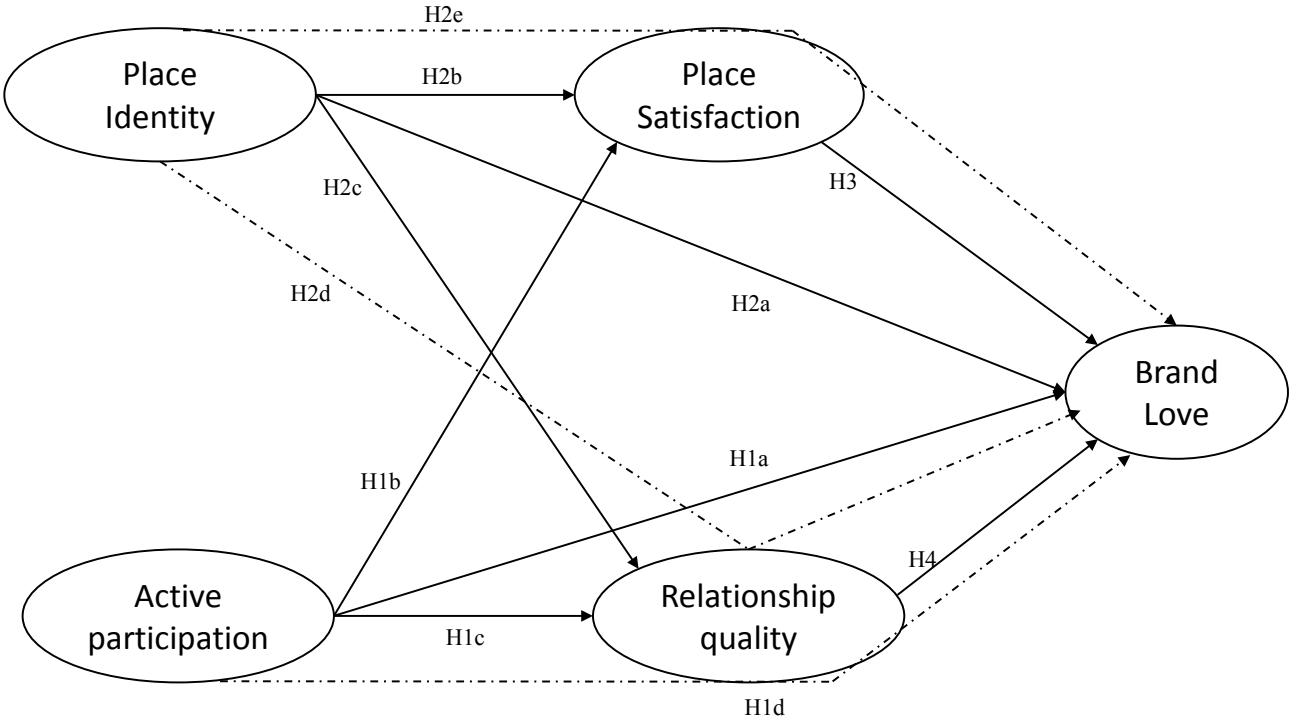


Figure 1. Conceptual model. Note: Dashed lines represent the mediating effects.

3. METHOD

The target population was constituted by wine tourists who visited wine regions in Portugal during the last three years (at least on one occasion). The use of an extended time frame regarding the experience allows to expand the sample dimension We used this procedure following previous research approaches (c.f., [42]). Since the determination of the sampling frame was difficult, to test the research hypotheses, we used a non-probability sampling, through a convenience sampling. The questionnaire was elaborated by initially consulting the relevant literature where the measurement scales were adopted, as described below. The initial version of the questionnaire content was assessed by four tourism academics and translated to Portuguese. The procedure was followed by a pilot test to a small sample of eight respondents. Wording was revised based on the results of this procedure. The final version was created online in Portuguese and in English and sent by email and disseminated in wine social media groups during January 2022. A total of 186 complete questionnaires were received.

Of the respondents, 61.5% were male, and 80% reported living in urban locations. Most of the respondents (65.9%) revealed to have an average income, 30.4% indicated a good income, and 3.7% declared to be in a difficult situation. In terms of age, 3.7% were less than 30 years old, 17.0% were between 31 and 40 years old, 39.3% were between 41 and 50 years old, 27.4% were between 51 and 60 years old, and the remaining were older than 61. 53% of the respondents were Portuguese, 19% Spanish, 9% English, 9% French, 7% Brazilian, and the other were from other European countries. Although this may suggest the use of control variables, they were not tested for two main reasons: (i) representativeness: Our aim was to capture a broad range of experiences and perceptions among wine tourists. Including a significant proportion of Portuguese respondents allowed us to gain insights from both local and international tourists, thereby enhancing the representativeness of our findings. (ii) generalizability: By not controlling for nationality, we were able to examine the relationship between brand love and visitor satisfaction across a diverse sample. This increases the generalizability of our findings to other contexts beyond Portuguese wine tourism.

The constructs used in this study were adopted from existing scales. As such, place satisfaction and place identity both with three items were adapted from the scales of Sabina del Castillo et al. [47]. Brand love measurement composed by eight items, was adapted from Carroll and Ahuvia [17]. The relation quality was measured using a five-item scale adapted from Fernandes and Pinto [48]. The three items used to measure the active participation were adapted from Campos et al. [49]. All the constructs were measured using five-point Likert-type scales anchored by one (strongly disagree) and five (strongly agree). The items are included in the appendix.

We used structural equation modelling (SEM) to assess the measurement and structural model. More specifically, we used a variance-based structural equation modelling technique based on partial least squares (PLS). For data processing we adopted SmartPLS 3 software [50] due to the sample size and the exploratory nature of the model. It presents greater flexibility when it is not possible to meet the hard assumptions of more strict structural equation modelling approaches [51]. The PLS algorithm creates loadings between the constructs and their indicators that allow to measure construct validity that will be presented [52]. As described below the analyses and interpretation of the results was first conducted to assess the reliability and validity of the measurement model. Second, the structural model was evaluated.

For the analyses and interpretation of the quality of the measurement model we followed Hair et al. [53] recommendations to assess the reliability of the individual indicators, convergent validity, internal consistency reliability, and discriminant validity. The results are presented in table 1 and figure 2. First, the standardized factor loadings of all items were superior to 0.6 (all significant for $p < 0.001$), showing that the individual indi-

Table 1. Composite reliability, average variance extracted, correlations, and discriminant validity checks.

Latent Variables	α	CR	AVE	1	2	3	4	5
(1) Active participation	0.932	0.957	0.881	**0.938**	0.469	0.604	0.601	0.685
(2) Brand Love	0.967	0.972	0.812	0.446	**0.901**	0.554	0.574	0.533
(3) Place Identity	0.932	0.957	0.881	0.567	0.528	**0.939**	0.762	0.518
(4) Place Satisfaction	0.898	0.936	0.830	0.551	0.539	0.697	**0.911**	0.686
(5) Relation Quality	0.967	0.974	0.883	0.650	0.518	0.493	0.640	**0.940**

Note: α -Cronbach Alpha; CR -Composite reliability; AVE -Average variance extracted. Bolded numbers are the square roots of AVE. Below the diagonal elements are the correlations between the constructs. Above the diagonal elements are the HTMT ratios.

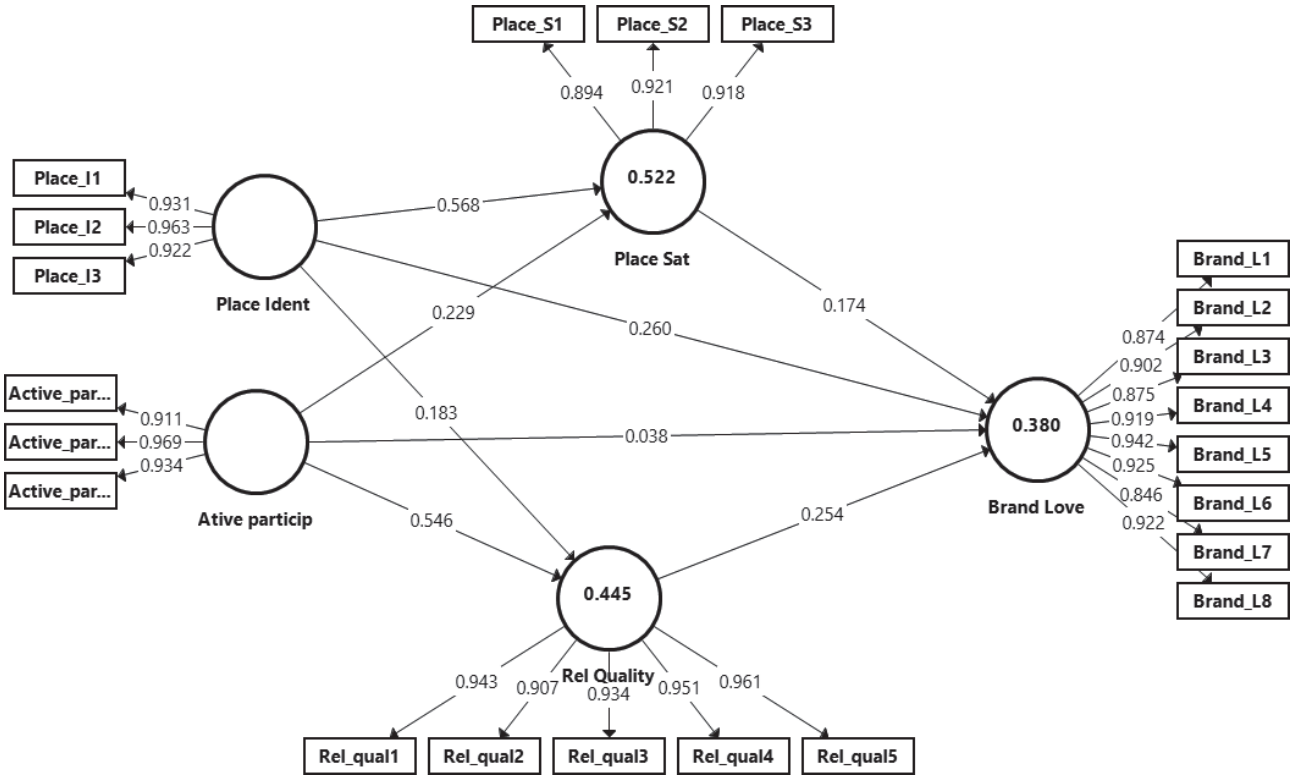


Figure 2. Path coefficient of the structural model.

cator are reliable [53]. Furthermore, since all the constructs' Cronbach alphas and composite reliability (CR) values were above 0.7, the internal consistency reliability was assured [53].

Convergent validity of all the constructs was upheld for three main reasons. The first reason is that all items loaded positively and significantly on their constructs. The second is related to the CR values which were superior to 0.70 for all constructs. Third, as Table 1 shows, the average variance extracted (AVE) values are all well above 0.50 (AVE) [54]. Discriminant validity was the next procedure. It was assessed by combining two approaches. First, we tested for the Fornell and Larcker criterion, which requires that the AVE square root of each construct of AVE is higher than its biggest correlation with any construct [55]. This criterion was confirmed for all constructs. Second, constructs exhibited discriminant validity also because all the heterotrait-monotrait ratio (HTMT) were lower than 0.85 [53,56].

To assess the quality of the structural model we followed a three-step procedure. First, the absence of collinearity among all the constructs' indicators was determined by estimating the variance inflation factor (VIF) indicator which was inferior to 5 [53] evidencing no collinearity. Second, the R^2 or the coefficient of the determination for the three endogenous variables of brand love, place satisfaction and relation quality were 38.0%, 52.2%, and 44.5%, respectively, meaning that they were higher than 10%. Third, the Stone-Geisser Q^2 values obtained through the blindfolding procedures for all the endogenous variables (0.297, 0.425, and 0.382 respectively) were larger than zero, supporting the predictive relevance of the model.

4. RESULTS AND DISCUSSION

We used bootstrapping procedures (considering 5.000 subsamples) to assess the significance of the parameter estimates [53]. The results in Table 2 show that active participation has a significantly positive effect on place satisfaction and relation quality (b =0.229, p < 0.05; b =0.546, p < 0.001, respectively) but not on brand love (b = 0.038, n.s.). These results provide support for H1b and H1c, however, H1a is not supported by the results. Place Identity has a significantly positive relation with brand love (b = 0.260, p < 0.01), place satisfaction (b = 0.568, p < 0.001) and relation quality (b = 0.183, p < 0.01), which supports H2a, H2b and H2c, respectively.

Table 2. Structural model assessment.

Path	Path coefficient	Standard errors	*t* statistics	*p* values
Active participation → Brand Love	0.038	0.112	0.338	0.736
Active participation → Place Satisfaction	0.229	0.091	2.524	0.012
Active participation → Relation Quality	0.546	0.078	7.019	0.000
Place Identity → Brand Love	0.260	0.096	2.702	0.007
Place Identity → Place Satisfaction	0.568	0.071	8.000	0.000
Place Identity → Relation Quality	0.183	0.069	2.672	0.008
Place Satisfaction → Brand Love	0.174	0.124	1.397	0.163
Relation Quality → Brand Love	0.254	0.108	2.353	0.019

Table 3. Bootstrap results for indirect effects.

Indirect effect	Estimate	Standard errors	*t statistics*	*p* value
Active participation → Relation Quality * Brand Love	0.138	0.061	2.257	0.024
Active participation → Place Satisfaction * Brand Love	0.040	0.034	1.158	0.247
Place Identity → Relation Quality * Brand Love	0.047	0.030	1.538	0.125
Place Identity → Place Satisfaction * Brand Love	0.099	0.072	1.372	0.171

The relationship between place satisfaction and brand love (b = 0.174, n.s.) was not significant, as such H3 was not supported. Finally, the influence of relation quality and brand love was found to be positive and significant (b =0.254, $p < 0.05$), providing support for H4.

The mediating hypotheses were also test using boostraping procedures. Table 3 shows that the mediating effect of relation quality in the relationship between active participation and brand love is positive and significant (b =0.138, $p < 0.05$), providing support for H1d. Furthermore, since the direct effect was not significant, it is considered full mediation. The other indirect relationships were not significant, thus H1e, H2d and H2e were not supported.

To extend these results we also conducted an Important-Performance Matrix Analysis (IPMA), to identify the relative importance and the performance of each construct by evaluating all the related paths in the structural model. IPMA is a tool for evaluating the performance of constructs in a PLS-SEM model. It is based on the idea that the importance of a construct is determined by its overall impact on the model, while its performance is determined by its ability to meet or exceed the expectations of stakeholders. The IPMA estimates are calculated using a two-step process. First, importance calculation of each construct is calculated by summing the absolute values of the path coefficients that connect it to other constructs in the model. This calculation is performed for both the outer and inner models. Second, the performance calculation of each construct is calculated by comparing the importance weights (calculated in step 1) to the importance weights that would be expected based on the stakeholder expectations. This calculation is also performed for both the outer and inner models. IPMA provides important insights by identifying which construct is more important and better perform regarding the influence on the dependent variable [57], in this case, brand love. Figure 3 summarizes the evaluation of the importance and the performance of each construct.

Accordingly, to the IPMA analysis relation quality is the construct with the stronger relationship with brand love (performance = 0.266), followed by place identity (performance = 0.238), place satisfaction (performance = 0.201) and finally active participation (performance = 0.039). Relation quality is more influenced by active participation when compared with the influence of place identity. Regarding place satisfaction, the importance is the opposite, meaning that place identity shows a stronger influence than active participation.

The study findings indicate that a wine tourism experience, such as visiting a winery or participating in a wine tasting event, fosters a stronger brand love for both the wine region and its wineries in the line of the research of [6]. This suggests that wine tourism experiences enhance brand perception through the influence

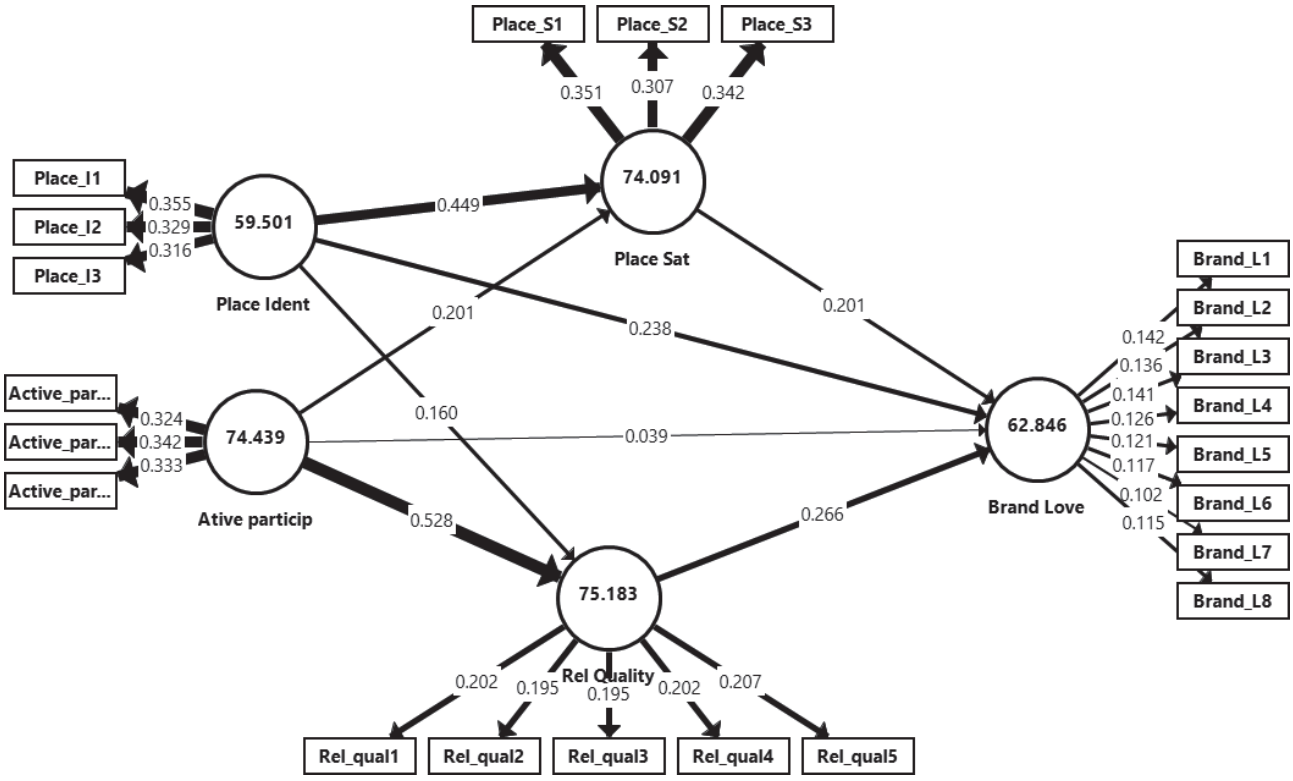


Figure 3. Path coefficient of the IPMA model. Note: The numbers insider the circles represent the importance of each latent variable; the numbers between the arrows represent the rescaled outer weights (calculated by dividing the absolute values of the path coefficients by the total variance of the endogenous construct).

of place identity and relationship quality as stated by Kaufmann et al. [34] and Gharib et al. [35]. The path analysis, bootstrap and IPMA analysis demonstrated that place identity and relation quality are the most relevant antecedents of brand love.

It is also both positively related to place satisfaction [4]. This implies that emotions (i.e., a sense of belonging) towards the overall location is correlated with the satisfaction and the quality perception associated to the region. It was also found a full mediating effect of quality between in the relationship between active participation and brand love. Being brand love a very specific and strong feeling and a unique connection [18], it might be difficult to attain at a higher level just based on a single visit/tasting. Therefore, and for instance, some emerging studies on brand love have reported potential dissimilarities between different cultures in both the consequences of brand love and the terms used in relation to the concept [58]. However, and according to Aro et al. [4] several satisfied customers who also love the brand are more committed to repurchasing it [17]. It has also been suggested that consumers have a passionate desire for their loved brands (e.g. [16]) and a strong willingness to retain their affinity with them [4].

The direct relationship between brand love and satisfaction was not supported by the results. With the place possibly because this construct is based on subjective factors such as tranquillity, environment, and place development, that might not be perceived as relevant to build a brand love by the wine tourists. Visitors might have different expectations from their visit that are not necessarily tied to their love for the brand. These could include the desire for a unique experience, learning about wine production, or simply enjoying the scenery of the vineyard. Therefore, this result may derive from scale items limitations. The research of Strandberg and Styvén [59] also found some limitation in measuring place brand love suggesting that it was a result of the nature of the brand: evaluating a place instead of a physical product.

It was found that relation quality is also a key construct that also contributes greatly to brand love. This is a relevant finding of the research: the perceived quality of the winery/wine region is critical to the development of brand love and appears to be associated with the contribution of some authors, such as Sallam and Wahid [60]. It was also found significant relationships between

the antecedent/independent constructs of the wine visit/tourism experience: Active participation is both positively related to place satisfaction and to relation quality. The fact that relation quality is more influenced by active participation than place identity proves that activities do enhance relationships that, in its turn, can create brand love. Although H1a has been rejected (the direct relationship between active participation and to brand love) there's a link between them in the mediating effect provided by the relation quality in brand love.

The fact that the other hypothesis related with Brand Love (H1a., H1e., H2d., H3) were rejected may be due, as stated before, that brand love implies a very strong relationship with a very specific subject (brand). In a wine visit these feelings could be directed and dispersed toward different subjects such as the wine region, the winery specific brands, the visited site, or even the type of wine (i.e., in Douro for a fortified wine or in Provence for a Rosé). This explains why place identity plays such a relevant role in the development of brand love due to the referred previous emotional bound that can be established with the visited region or site [40,41].

The IPMA showed the hierarchy of the relationship of the wine tourism experience with the dependent variable: accordingly, relation quality is the construct with the stronger relationship with brand love, followed by place identity, and, finally, active participation. Relation quality is more influenced by active participation when compared with the influence of place identity. This makes sense as any activity inside the cellar our during the visit, would enhance the perception of the winery quality. Regarding the place satisfaction, the importance is the opposite, meaning that place identity shows a stronger influence than active participation, because the sense of identity and belonging, that sometimes, can be just a mere desire to idealistic live in such place, contributes to the overall satisfaction with the location. In these cases, it would be expected that regions with higher reputations will develop this relationship in a more effective way than others.

5. CONCLUSIONS

This research made significant contributions to our understanding of the impact of wine tourism experiences, particularly wine visits, on brand love and its underlying factors. It is crucial to understand how specific experiences, such as wine visits, can cultivate brand love, given its complexity and strength. The study also shed light on the connections between active participation in wine tourism and relationship quality, which mediates the link between active participation and brand love.

This research also identifies some specific determinants for wine tourism love brand. Brand love is a complex and strong emotion that can be enhanced by a specific experience, such as a wine visit. The study also explores the relations between active participation in the wine tourism, and the relation quality that mediates its impact on brand love. Place identity is a key factor for the formation of brand love, confirming the proposition of Fountain et al. [8] that satisfaction with the wine territory is a powerful tool for the development of wine brand love. Therefore, wine regions and wineries with a high level of perceived notoriety are more likely to achieve higher levels of brand love, in line with the findings of Drennan et al. [2] and Dias et al. [61]. This research also has some practical implications for tourism management and marketing, especially in the areas of wine tourism, brand management, and consumer behaviour. It is important to develop the relation quality perceptions of the winery by increasing its reputation and offering some activities that can strengthen the bond with the visitors. Besides tasting the wines and listening to the information about the region and the winery, other activities can be more engaging and interactive, such as wine quizzes, blending workshops, or harvesting experiences. The creation of a winery shop and an online delivery service can also reinforce the bond between the visitor and the brand, and encourage repeat purchases and referrals. Moreover, the practical implications should extend to the whole wine destination management, as the quality of the experience and the consequent satisfaction depend on all the components of a vacation, such as hotel, transportation, restaurants, and other attractions. Therefore, it is essential to coordinate and integrate the different stakeholders of the wine destination, and to ensure that they offer consistent and complementary services and products that meet the expectations and needs of the wine tourists. The wine destination should also communicate its unique identity and value proposition, and create a strong and distinctive place brand that can attract and retain loyal and passionate customers.

6. LIMITATIONS AND FUTURE RESEARCH

This study is mainly restricted by being a cross sectional study using a convenience online sample. The sample is limited in size, although it surpasses the recommended threshold for PLS-SEM analysis. It is important to acknowledge the limitations of the study's generalizability. Further research is needed to determine whether the findings of this study can be gener-

alized to other populations or contexts. The pandemic period, when wine visits were stopped or limited, may have affected the accuracy of the data collection, as some respondents may not have fresh memories of their experiences. Future research could explore how place identity influences brand love in different wine regions, depending on their perceived reputation by the visitors. It could also examine which activities can improve the perception of relation quality and enhance its effects on brand love and future behaviours, such as word of mouth and demand for the visited wine brand. Finally, we view the potential influence of nationality on the relationship between brand love and visitor satisfaction as an interesting avenue for future research. In this study, we provide a baseline understanding of this relationship in a diverse sample, which future studies could build upon by examining the moderating role of nationality.

FUNDING

This study was supported by Fundação para a Ciência e a Tecnologia, grant UIDB/00315/2020.

REFERENCES

[1] Santos, V., Dias, A., Ramos, P., Madeira, A., & Sousa, B. (2021). Mapping the wine visit experience for tourist excitement and cultural experience. *Annals of Leisure Research*, 1-17.

[2] Drennan, J., Bianchi, C., Cacho-Elizondo, S., Loureiro, S., Guibert, N., & Proud, W. (2015). Examining the role of wine brand love on brand loyalty: A multi-country comparison. *International Journal of Hospitality Management*, *49*, 47-55.

[3] Ahuvia, A. C., Batra, R., & Bagozzi, R. P. (2014). Love, desire, and identity: A conditional integration theory of the love of things. In *Handbook of brand relationships* (pp. 364-379). Routledge.

[4] Aro, K., Suomi, K., & Saraniemi, S. (2018). Antecedents and consequences of destination brand love - A case study from Finnish Lapland. *Tourism Management*, *67*, 71-81.

[5] Gumparthi, V. P., & Patra, S. (2020). The phenomenon of brand love: a systematic literature review. *Journal of Relationship Marketing*, *19*(2), 93-132.

[6] Long-Tolbert, S. J., & Gammoh, B. S. (2012). In good and bad times: The interpersonal nature of brand love in service relationships. *Journal of Services Marketing*.

[7] Alant, K.; Bruwer, J. Wine tourism behaviour in the context of a motivational framework for wine regions and cellar doors. J. Wine Res. 2004, 15, 27–37.

[8] Fountain, J., Charters, S., & Cogan-Marie, L. (2021). The real Burgundy: negotiating wine tourism, relational place and the global countryside. *Tourism Geographies*, *23*(5-6), 1116-1136.

[9] Santos, V., Dias, A., Ramos P., Madeira A., & Sousa B. (2022). The influence of wine storytelling on the global wine tourism experience, *Wine Economics and Policy. 11* (1), 3-13. https://doi.org/10.36253/wep-11454

[10] Statista (2021). *World's top wine tourism destinations*. Available on: usebounce.com

[11] Travel BI (2022). *Wine tourism: national and European dimension*. Available on: https://travelbi.turismodeportugal.pt/en/tourism-in-portugal/wine-tourism-national-and-european-dimension/

[12] Fournier, S., & Mick, D. G. (1999). Rediscovering satisfaction. *Journal of marketing*, *63*(4), 5-23.

[13] Oliver, R. L. (1999). Whence consumer loyalty?. *Journal of marketing*, *63*(4_suppl1), 33-44.

[14] Nyamekye, M. B., Adam, D. R., Boateng, H., & Kosiba, J. P. (2023). Place attachment and brand loyalty: the moderating role of customer experience in the restaurant setting. *International Hospitality Review*, *37*(1), 48-70.

[15] Bergkvist, L., & Bech-Larsen, T. (2010). Two studies of consequences and actionable antecedents of brand love. *Journal of brand management*, *17*(7), 504-518.

[16] Batra, R., Ahuvia, A., & Bagozzi, R. P. (2012). Brand love. *Journal of marketing*, *76*(2), 1-16.

[17] Carroll, B. A., & Ahuvia, A. C. (2006). Some antecedents and outcomes of brand love. *Marketing letters*, *17*(2), 79-89.

[18] Amaro, S., Barroco, C., & Antunes, J. (2020). Exploring the antecedents and outcomes of destination brand love. *Journal of Product & Brand Management*. 30(3), 433-448. https://doi.org/10.1108/JPBM-08-2019-2487

[19] Swimberghe, K. R., Astakhova, M., & Wooldridge, B. R. (2014). A new dualistic approach to brand passion: Harmonious and obsessive. *Journal of Business Research*, *67*(12), 2657-2665.

[20] Swanson, K. (2015), Place brand love and marketing to place consumers as tourists, Journal of Place Management and Development, 8(2), 142-146.

[21] Swanson, K. (2017). Destination brand love: managerial implications and applications to tourism businesses. Journal of Place Management and Development, Vol. 10 No. 1, pp. 88-97.

[22] Barreda, A., Okumus, F., Nusair, K.K. and Bilgihan, A. (2016), "The mediating effect of virtual interactivity in travel-related online social network websites", International Journal of Hospitality & Tourism Administration, Vol. 17 No. 2, pp. 147-178

[23] Islam, J. U., & Rahman, Z. (2016). Examining the effects of brand love and brand image on customer engagement: An empirical study of fashion apparel brands. *Journal of global fashion marketing*, *7*(1), 45-59.

[24] Johnson, R., & Bruwer, J. (2007). Regional brand image and perceived wine quality: the consumer perspective. *International Journal of Wine Business Research*.

[25] Pine, B., & Gilmore, J. (1998). Welcome to the experience economy. Harvard Business Review, 76(4), 97–105.

[26] Thanh, T. V., & Kirova, V. (2018). Wine tourism experience: A netnography study. *Journal of Business Research*, *83*, 30-37.

[27] Carvalho, M., Kastenholz, E., & Carneiro, M. J. (2021). Interaction as a Central Element of Co-Creative Wine Tourism Experiences—Evidence from Bairrada, a Portuguese Wine-Producing Region. *Sustainability*, *13*(16), 9374.

[28] Kovalenko, A., Dias, Á., Pereira, L., & Simões, A. (2023). Gastronomic Experience and Consumer Behavior: Analyzing the Influence on Destination Image. *Foods*, 12(2), 315.

[29] Yuan, J. J., So, S. I., & Chakravarty, S. (2005). To wine or not to wine: profiling a wine enthusiast for a successful list. *Journal of nutrition in recipe & menu development*, *3*(3-4), 62-79.

[30] Lee, K., Kladou, S., Usakli, A., & Shi, Y. (2022). Inspiring winery experiences to benefit destination branding? Insights from wine tourists at Yantai, China. *Journal of Hospitality and Tourism Insights*, *5*(1), 116-137.

[31] Khaokhrueamuang, A. (2022). Branding wine products and wine tourism destinations through e-storytelling: Examining contemporary tourism interpretation. In *Routledge Handbook of Wine Tourism* (pp. 588-602). Routledge.

[32] Thomas, B., Quintal, V. A., & Phau, I. (2018). Wine tourist engagement with the winescape: Scale development and validation. *Journal of Hospitality & Tourism Research*, *42*(5), 793-828.

[33] Carlsen, J., & Boksberger, P. (2015). Enhancing consumer value in wine tourism. *Journal of Hospitality & Tourism Research*, *39*(1), 132-144.

[34] Kaufmann, H.R., Loureiro, S.M.C. and Manarioti, A. (2016), "Exploring behavioural branding, brand love and brand co-creation", *Journal of Product & Brand Management*, Vol. 25 No. 6, pp. 516-526. https://doi.org/10.1108/JPBM-06-2015-0919

[35] Gharib, R. K., Philpott, E., & Duan, Y. (2017). Factors affecting active participation in B2B online communities: An empirical investigation. *Information & Management*, *54*(4), 516-530.

[36] Rachão, S., Breda, Z., de Oliveira Fernandes, C., Joukes, V., & Ferreira, C. (2023). Food-and-wine tourists' willingness to pay for co-creation experiences: A generational approach. *Journal of Hospitality and Tourism Management*, *56*, 245-252.

[37] Williams, H. A., Yuan, J., & Williams Jr, R. L. (2019). Attributes of memorable gastro-tourists' experiences. *Journal of Hospitality & Tourism Research*, *43*(3), 327-348.

[38] Wang, S., & Chen, J. S. (2015). The influence of place identity on perceived tourism impacts. *Annals of Tourism Research*, *52*, 16-28.

[39] Yuan, Q., Song, H., Chen, N., & Shang, W. (2019). Roles of tourism involvement and place attachment in determining residents' attitudes toward industrial heritage tourism in a resource-exhausted city in China. *Sustainability*, *11*(19), 5151.

[40] Gross, M. J., & Brown, G. (2008). An empirical structural model of tourists and places: Progressing involvement and place attachment into tourism. *Tourism management*, 29(6), 1141-1151.

[41] Santos, V. R., Ramos, P., Almeida, N., & Santos-Pavón, E. (2019). Wine and wine tourism experience: A theoretical and conceptual review. *Worldwide Hospitality and Tourism Themes*.

[42] Cardinale, S., Nguyen, B., & Melewar, T. C. (2016). Place-based brand experience, place attachment and loyalty. *Marketing Intelligence & Planning*, 34(3).

[43] Dias, Á., Cascais, E., Pereira, L., Lopes da Costa, R., & Gonçalves, R. (2022). Lifestyle entrepreneurship innovation and self-efficacy: Exploring the direct and indirect effects of marshaling. *International Journal of Tourism Research*, 24(3), 443-455.

[44] Shumaker and Taylor, (1983). Toward a clarification of people–place relationships: A model of attachment to place N. Feimer, E.S. Geller (Eds.), Environmental psychology: Directions and perspectives, Praeger, New York, NY (1983), pp. 219-251

[45] Li, M.W., Teng, H.Y., & Chen, C.Y. (2020). Unlocking the customer engagement–brand loyalty relationship in tourism social media: The roles of brand attachment and customer trust. *Journal of Hospitality and Tourism Management*, 44, 184–192.

[46] Thomson, M., MacInnis, D. J., & Park, C. W. (2005). The ties that bind: measuring the strength of consumers' emotional attachments to brands. *Journal of Consumer Psychology*, *15*(1), 77–91.

[47] Sabina del Castillo, E. J., Díaz Armas, R. J., & Gutiérrez Taño, D. (2021). An Extended Model of the Theory of Planned Behaviour to Predict Local Wine Consumption Intention and Behaviour. *Foods*, 10(9), 2187.

[48] Fernandes, T., & Pinto, T. (2019). Relationship quality determinants and outcomes in retail banking services: The role of customer experience. *Journal of Retailing and Consumer Services*, *50*, 30-41.

[49] Campos, A. C., Mendes, J., do Valle, P. O., & Scott, N. (2017). Co-creating animal-based tourist experiences: Attention, involvement and memorability. *Tourism management*, *63*, 100-114.

[50] Ringle, C.M., Wende, S., & Will, A. (2015). SmartPLS3.0. Hamburg:www.smartpls.de.

[51] Lohmoller, J. (1989). Latent *Variable Path Modelling with Partial Least Squares*. Physica-Verlag, Heidelberg.

[52] Chin, W. (2010). How to write up PLS and report PLS Analyses, in V. Esposito Vinzi et al. (eds.), *Handbook of Partial Least Squares*, pp. 655-690, Springer.

[53] Hair Jr, J.F., Hult, G.M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling* (PLS-SEM). Sage Publications.

[54] Bagozzi, R.P., & Yi. Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*(1), 74-94

[55] Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 29–50.

[56] Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115-135.

[57] Slack, N. (1994**).** The importance-performance matrix as a determinant of improvement priority. *Int. J. Operations and Production Management, 14*, 59–75.

[58] Albert, N., Merunka, D., & Valette-Florence, P. (2008). When consumers love their brands: Exploring the concept and its dimensions. *Journal of Business research*, *61*(10), 1062-1075.

[59] Strandberg, C. and Styvén, M.E. (2020). What's love got to do with it? Place brand love and viral videos, Internet Research, *30*(1), 23-43.

[60] Sallam, M. A., & Wahid, N. A. (2015). The effects of satisfaction and brand identification on brand love and brand equity outcome: the role of brand loyalty. *European Journal of Business and Social Sciences*, *4*(9), 42-55.

[61] Dias, A., Sousa, B., Santos, V., Ramos, P., & Madeira, A. (2023). Wine Tourism and Sustainability Awareness: A Consumer Behavior Perspective. *Sustainability*, *15*(6), 5182.

APPENDIX

Construct and Items	Code	Standardized Factor loadings
Active participation		
During my stay in this wine region, I directly interact with local producers	Active_partic1	0.911
During my stay in this wine region, I participate actively in wine and gastronomy activities.	Active_partic2	0.969
My holiday experience is enriched with my participation in wine and gastronomy activities.	Active_partic3	0.934
Brand Love (Regarding the brand of this wine region…)		
This is a wonderful brand	Brand_L1	0.874
This brand is totally awesome	Brand_L2	0.902
I have positive feelings about this brand	Brand_L3	0.875
This brand makes me very happy	Brand_L4	0.919
I love this brand!	Brand_L5	0.942
This brand is a pure delight	Brand_L6	0.925
I'm very attached to this brand	Brand_L7	0.846
This brand makes me feel good	Brand_L8	0.922
Place Identity		
I feel that I belong here and that it's part of my identity.	Place_I1	0.931
I like living here and I feel connected to this place.	Place_I2	0.963
It's the best place to do the things I like.	Place_I3	0.922
Place satisfaction		
Satisfaction with local tranquillity	Place_S1	0.894
Satisfaction with the level of local development	Place_S2	0.921
Satisfaction with the local living environment	Place_S3	0.918
Relationship Quality		
I'm confident in the local personel expertise, they know what they are doing	Rel_qual1	0.943
The wine region keeps my best interests in mind	Rel_qual2	0.907
The wine region is a safe and reputable	Rel_qual3	0.934
Overall I am satisfied with this wine region and the service they provide	Rel_qual4	0.951
My feelings towards the wine region are very positive	Rel_qual5	0.961

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Terziyska, I. (2024). Drivers of memorable wine tourism experiences – a netnography study. *Wine Economics and Policy* 13(1): 17-31. doi: 10.36253/wep-14433

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Drivers of memorable wine tourism experiences – a netnography study

Ilinka Terziyska

Southwest University Neofit Rilski, Bulgaria
E-mail: lynnterziyska@gmail.com

Abstract. This study serves a dual purpose: firstly, to identify the pivotal architectural components within wine tourism offerings that contribute to a lasting and memorable experience; and secondly, to explore their correlation with the four customer experience realms (4Es). The investigation operates at a micro level, focusing on a specific category of winery – small, family-owned establishments – in an emerging wine destination. Employing a netnography approach, the research design centers on a thematic analysis of visitor reviews sourced from TripAdvisor. The ensuing results are quantified to ascertain the significance of individual factors. A total of 137 reviews spanning the period from June 2013 to May 2022 were manually extracted and coded using MaxQDA. This study's rationale rests upon two key premises: firstly, the scarcity of research within the specific context of emerging wine destinations from the post-Eastern bloc; and secondly, the limited exploration of the nexus between wine tourism drivers and consumer experiences. The most influential drivers shaping memorable wine tourism encounters that we identified are "people" and "wine", predominantly associated with the escapist and aesthetic dimensions of experience. These findings diverge markedly from prior research, where the escapist dimension typically received minimal attention. Theoretically, our results enrich understanding by elucidating how the four dimensions of the wine tourist experience intersect with the attributes of the tourism offering, thereby serving as a potential model for future investigations. Moreover, wineries stand to gain valuable insights for product design aimed at enhancing the overall consumer experience.

Keywords: wine tourism experiences, 4Es, family-owned winery, netnography, Bulgaria.

1. INTRODUCTION

Ever since the introduction of the experience economy concept in the late 1990s [1], customer experiences have been a buzz word for marketeers of different fields, including tourism. Memorable wine experiences exert a positive influence on customer satisfaction [2,3] and significantly shape the image of the winery or wine destination [4]. Furthermore, these encounters can stimulate revisit intentions [2,5]. The impact is amplified when all four dimensions of the experience – educational, entertainment, aesthetic, and escapist – converge, forming a compelling "sweet spot" [1]. However, it's

essential to recognize that various studies underscore the distinct roles played by individual dimensions across diverse tourism contexts [2].

In wine tourism, experiences have been studied at both the macro (destination) [2,4] and the micro (winery) level [6,7]. A number of them have been based on the 4Es model of Pine and Gilmore, according to which customer experience can be defined by four distinct dimensions, or realms: educational, escapist, aesthetic, and entertainment. There are, however, some differences in the conceptualization of individual dimensions that make comparisons difficult [2], the most problematic being the escapist one, which was originally defined as active involvement by Pine and Gilmore [1], but is sometimes more broadly described as a departure from daily routine. In addition, the vast majority of studies to date have looked at the notion of active involvement primarily from a physical point of view (participating in various activities such as grape picking, etc.), completely neglecting the possibility that an experience can be described as active also because of its social aspect, e.g. engaging oneself in interaction with winery employees.

Despite the abundancy of research, there is still a call for contributions to the theoretical framework of wine tourism experiences by providing evidence from different contexts (Old and New World regions) and identifying the supply-related elements that are positively linked to each of the four dimensions [8]. Furthermore, in methodological terms, there is a need for in-depth qualitative studies, complemented by quantitative measures, to provide more insight into individual experience dimensions [3].

This study operates at a micro level, aiming to discern the architectural components within wine tourism that significantly shape memorable customer experiences. It focuses on a specific winery, deliberately chosen to represent a distinct context: a family-owned establishment situated in an emerging wine destination, which is an example of a good practice – it ranked among the top 100 world's best vineyards for 2020, 2021, and 2022 [9]. The main method that was used is thematic analysis of user-generated content and TripAdvisor was chosen for data collection because of its wide popularity, which results in a large number of reviews available, and its high degree of reliability [10], [11]. Diverging from prior studies that begin with the four experience dimensions and associate them with specific winery-related activities, our investigation centres on the winescape, exploring how its constituent elements contribute to memorable experiences and align with the four experience dimensions.

2. LITERATURE REVIEW

2.1. Tourism and the experience economy

The term experience economy was coined in 1998 by Pine and Gilmore to denote a shift to an economic state where instead of selling goods or services, companies orchestrate memorable experiences [12]. Being memorable is the main characteristics of this new type (or even a new genre) of economic offering that differentiates it from the previous ones. While services, for example, could be customized, but yet remain external to the customer, experiences are inherently personal and exist "only in the mind of an individual who has been engaged on an emotional, physical, intellectual, or even spiritual level" [13]. Innovative experiences are a process of co-creation, with the customer being actively engaged in an interaction with the provider [14].

In the years following the introduction of the concept, it has attracted the attention of a large number of researchers from various fields, adopting different perspectives. In an attempt to summarize the vast amount of literature, Helkkula [15] identified three major approaches to researching consumer experiences, based on different epistemological assumptions:

1) Phenomenological characterisation. Regarded as the stem of customer experience research, it focuses on the nature of the phenomenon and is usually customer-centred although other actors (such as the service provider) are also a relevant subject of research.
2) Process-based characterisation. Service experience is seen (and studied) as a process, the attention is driven to its architectural elements and the stages through which it goes, and there is often a special emphasis on the transformational aspect. Again, the customer is the primary research subject.
3) Outcome-based characterisation. This approach refers to linking certain variables to different outcomes (such as satisfaction or repurchase intention), usually in a quantified manner. The antecedents of service experience are sometimes also included in this research string. Unlike the previous two approaches, here the focus has been shifted from the individual person to „the aggregated service experience of multiple respondents". [15, p. 379].

About two decades later, the above typology was complemented by a fourth research string – the designled perspective on service experience. Based on the service design theory, Schallehn et al. [16] identified three types of antecedents to experience co-creation: at the field, interactional and personal level. The field level is important because of the antecedents it contains, and

which refer to the structure of the respective sphere of economic activity. The interactional level, on the other hand, is about consumer motives and expectations related to their interaction with the service provider and includes all the phases of the service experience. It also encompasses the realization stage, where the offering-related antecedents of experience can be identified. Last, the personal level refers to the individual characteristics of consumers that are not directly linked to their expectations but still have some effect on motivation. The model incorporates the phenomenological aspect by claiming that the offering is just a medium conveying meaning to the customer, emphasizing the value-in-use concept [17], while the outcome-based one is used "to map descriptive knowledge related to the phenomenological perspective and to, thus, provide the grounds for applying prescriptive knowledge that is related to the process-based perspective" [16, p. 214].

One of the central themes in user experience research is its dimensions. The four dimensions are presented by the authors in a matrix of four quadrants, based on the opposition of two pairs of qualities: active-passive (refers to participation) and absorption-immersion (refers to connection). In an experience characterized by absorption, a person's attention is occupied, but they are not part of the event, while in immersion, the customer is physically (or virtually) involved and becomes part of it. An active experience implies that the customer can have an impact on the event, while in a passive experience they are only an observer, with no opportunity for real intervention [1]. The four realms of experience that are situated in this matrix are: entertainment (passive, absorption), educational (active, absorption), aesthetic (passive, immersion), and escapist (active, immersion). According to Pine and Gilmore, the optimal option combines educational, recreational, aesthetic and escapist elements at the same time, thus creating the so-called "sweet spot" [1].

In tourism, the 4Es model has been the basis for a significant amount of research. Within Kim So's model of research themes in tourism [18], it usually falls in the nomological group, connected to the development of experience scales and identifying cause-effect relations. It has been found applicable to examining the outcomes of tourism experiences [19], including loyalty [20], satisfaction [21], and intention to recommend [22]. Much of the research on the measurement of the tourist experience is also based on the four realms of experience introduced by Pine and Gilmore. In this regard, the scale proposed by Oh et al. [23] in 2007 is still the most widely used one.

Given the enormous diversity within the tourism sector, studies can also be grouped according to the specific area they are investigating. In Kim and So's typology [18], this is reflected in the conceptual understanding category, which includes specific cases such as medical tourism experiences or memorable dining experiences. As a niche form of tourism, wine tourism also requires special attention due to its characteristic features that distinguish it from other forms of tourism. It has also been established that individual experiential dimensions have a different impact in different contexts, even when it comes to the same type of product, for example festivals [21] , which in turn necessitates studies on different types of destinations/wine regions (e.g. Old and New World) and different type of sites (e.g. family wineries and larger wine cellars).

2.2. Wine tourism experiences

Wine tourism experiences have a complex, multi-dimensional character [24] and encompass numerous encounters and activities: the esthetics of the natural environment [25] and the winery architecture [26], interactions with the winery staff, learning about the production methods, wine tasting, appreciating the cultural and historical context of the region. While the hedonic character of wine tourism experiences seems undisputed [27], authenticity [28] and a sense of connection [29] are also of key importance.

Given their importance, customer experiences have been a popular topic in wine tourism research. In a systematic literature review, Kotur [30] identified four major themes: winescape, wine tourist behaviour, dimensions of the wine tourism experience, and co-creation and satisfaction. This study combines two of the themes – winescape and experience dimensions, with the aim of providing a better understanding of link between the supply-related drivers and the four Es of wine tourism experiences.

The first studies on wine tourism experiences appeared after in the late 1990s, shortly after the seminal work of Pine and Gilmore. In the last two decades their number has increased significantly [30] and they are mainly of the outcome-based and the process based types (following the typology of Helkkula [15]). The outcome-based type of studies are usually focused on the effect of wine tourism experiences on different aspects of wine tourist behaviour such as the intention to revisit [5], satisfaction [31,32], willingness to recommend [28] and positive word-of-mouth [5]. The process-based type explores the architectural elements of the wine tourism offering that a crucial for creating a memorable tourism experience. Most of these elements coincide with the winescape dimensions (as defined by various authors,

such as Quintal et al. and Bruwer et al. [33,34]), which is quite natural, as the winescape is sometimes defined as the environment, where wine tourism experiences take place [35]. Below is a presentation of the main themes that have been identified in the scientific literature so far.

1. Wine. This is the core wine tourism product and most usually the main purpose for winery visits. The main characteristics that increase its attractiveness and act as a driver for memorable experiences are quality, uniqueness [36], and authenticity / local character [37].
2. Winery. The two features that stand out are architecture and design [26], and atmosphere [38].
3. View/scenery. Wine tourism is not limited to a single winery visit, it's a holistic experience, in which the whole wine region plays a significant role and even defines its "flavour" [39]. The attractiveness of the scenery has been therefore identified as an important element in a number of studies [36,40,41].
4. Staff. Interactions with winery staff have often been cited as one of the most enjoyable elements of the wine tourism experience [39]. The key qualities identified so far are politeness/friendliness [25,42], passion [35], and knowledge/professionalism [38].
5. Food. The natural companion and best match of wine, food and food-related activities have been identified as one of the supply-related factors that have a positive impact on wine tourism experiences [40].

Most of the above studies, however, only identify the factors leading to memorable wine tourism experiences without examining the relationship between them and Pine and Gilmore's 4Es. One of the first empirical studies to make a direct link between dimensions of tourist experience and product characteristics of wine tourism is that of Pikkemaat et al. [43]. Using a quantitative method (visitor survey), they identified importance-performance gaps for the four dimensions, using in the South Tyrolean Wine Route in Italy as a case study. To do this, the authors distributed wine tourism activities among the four experience realms, thus implying that a certain activity is directly linked to a given experience dimension, e.g. a guided winery tour results in an educational experience. This model was further developed by Thahn and Kirova [44] and is currently the most widely used one in studies measuring wine tourism experiences, with very few differences in the distribution of wine tourism activities in terms of their relation with the experience dimensions. Below is a summary of the drivers most commonly attributed to each of the four experience dimensions.

The entertainment realm

Experiences that are within the entertainment realm are defined by passive participation, meaning that the consumer is not directly involved in the event and cannot affect it. They are also absorptive in terms of the relationship of the consumer and the environment, i.e. the event occupies "a person's attention by bringing the experience into the mind from a distance" [45, p. 46]. Some of the examples for entertainment activities as far wine tourism is concerned include: wine events [4], [43,44], concerts [36,46], wine blending [36,46], museum and heritage site visits [36,46], farm and food demonstrations [36,46], tasting in vineyards [43].

The educational realm

Just like entertainment experiences, educational ones are characterized by absorption, i.e. the guest's mind is occupied by the event. The difference, however, lies in the type of connection – here, it is a participatory one, expressed through an active engagement of the mind or body [1]. Examples for educational experiences in wine tourism include wine tastings [36,46], wine and food pairing [36,46], wine-making seminars [36,46], cooking classes [36,46], interactions with staff and owner [4,44].

The escapist realm

Pine and Gilmore [45] define the escapist realm of the tourist experience as immersive and active participation, the absolute opposite of the entertainment one. With this type of experience, there is detachment from the everyday environment (home and work) and immersion in a completely new one - which can have purely social dimensions. Pine and Gilmore compare this new environment to Oldenburg's 'third place' – "a generic designation for a great variety of public places that host the regular, voluntary, informal, and happily anticipated gatherings of individuals beyond the realms of home and work" [47, p. 16].

Most studies to date have neglected this social aspect of the escapist experience and have emphasized its active nature. Common activities mentioned are: hiking or cycling in the vineyards [36,46], hot air ballooning [36,46], vineyard tour by horse & carriage [36,46], grape picking [36,46]. One exception is Charters et al. [29], who argue that engaging the visitor with the place (the winery) is central to a compelling experience – and this is mainly done through communication with the staff.

The aesthetic realm

The aesthetic dimension denotes an experience, where the visitor is immersed in the environment or event but has no effect on it [1]. The drivers of such experienced are usually characterized by visual attractiveness, e.g. the winescape [36,46], unique lodging [36,46], unique wines [36,46], rural roads lined with vineyards [36,46], art and craft at the winery [36,46], well-tended wine bars and wine shops [4,43].

There is no consensus on the importance of each of the individual dimensions in the wine tourism context. According to some studies, aesthetics have a dominant role [2,43], others prioritize the educational aspect and entertainment [44]. In most empirical studies so far, the escapist dimension is almost inexistent, which is somehow illogical, given the fact that tourism itself is often described as an escapist experience. One possible reason for these results is the way in which escapist experiences are identified in wine tourism. As Quadri-Felitti et al. [2] note, some researchers define them as a getaway from daily routine, while others focus on their transcendence and immersiveness. In addition, in all studies to date, the activities associated with escapist experiences are mainly (if not exclusively) characterized by physical immersion (e.g. picking grapes, cycling in the vineyards, etc.), while the social aspect is completely ignored. At the same time, a number of studies indicate that it has a leading role for creating a memorable tourist experience [48]. Interaction with the winery staff and especially the owners are paramount to creating a sense of connection to the place [29,49], which can be described as an escapist experience – it is both immersive and active, and transcends the visitor beyond their usual social and physical environment.

What unites the majority of studies of the tourist experience to date is their predominantly deductive nature. Each of the four Es is assigned a specific winery activity/characteristic, usually based on logical reasoning. The main disadvantages of this approach are that: 1) it rejects the possibility that the same activity has several dimensions, and 2) it does not take into account the contextual features, i.e. the same activity, depending on the specific conditions, may or may not deliver a given experience dimension. An inductive approach would overcome these weaknesses by identifying the potential of different winescape elements to contribute to a particular dimension and determine whether in a particular context this potential is realised. However, this type of research is extremely rare. One recent example is the work of Kastenholz et al [50], who used a netnographic approach to identify the relationships between Pine and Gilmore's experience dimensions [1] based on a cross-sectional analysis of TripAdvisor reviews. The present study attempts to fill this gap by adopting an inductive bottom-up approach – the potential dimensions of the tourist experience for each of the individual winescape elements will be identified through the analysis of winery visitor reviews on TripAdvisor. The research questions of the study are:

1) What are the supply-related drivers of wine tourism experience at the winery level?
2) What dimensions of the tourist experience (following the four Es theory) do these drivers deliver?
3) Which of them are the most important for creating a memorable experience?

The first research question is related to identifying the main architectural elements of the wine tourism offering that contribute to a memorable experience and the second and third one – refer to the relationship between winescape elements and the four customer experience realms (4Es).

3. RESEARCH DESIGN

This section delineates the framework employed to investigate factors influencing memorable wine tourism experiences. This section encompasses three key components: Approach, Methods, and Data collection. The Approach subparagraph presents the overarching strategy guiding the study, while the Methods detail the specific techniques employed. Subsequently, the Data collection subsection provides insights into the gathering and analysis of pertinent information.

3.1. Approach

This study will adopt the design-led approach as defined by Schallehn et al [16], which is holistic in nature and takes into account all three traditional approaches: phenomenological, outcome-based, and process-driven [15], but will narrow its focus on the interactional level, and more specifically – the architectural elements of the wine tourism offering that shape the consumer experience. In this sense, it is predominantly process-driven, i.e. focused on "the design of the interaction between the service provider and the user and, thus, the configuration of the elements of the service offering"[16, p. 213], but also has an outcome-based element, expressed through the identification and measurement of the experience dimensions these elements (later called drivers) can deliver.

3.2. Method

In this study, the identification of the main drivers of memorable experiences in wine tourism is based on the quality of some impressions to be more prominent, or in other words, come first to one's mind and, as a consequence, to be verbalised more frequently - in this case, in TripAdvisor reviews. In scientific literature, this quality is known as salience [51, p. 163], and is broadly used in tourism marketing to identify critical product attributes [52-54]. It is also the principle notion that stands behind user-generated content (UGC)/netnographic studies, including the ones focused on wine tourism experiences [8,40,41,55]. Netnography, on the other hand, is claimed to be particularly relevant to analysing tourist experiences [56].

The salient attributes of the wine tourism offering that shape consumer experiences were identified through thematic analysis of TripAdvisor reviews.

The research stages were as follows:

1) Choosing a dataset: a Bulgarian winery with high rating on TripAdvisor.
2) Extraction of visitor reviews: a total of 137 reviews in English. The reviews were extracted manually and transferred to the MaxQDA software.
3) The third phase of our study involved in vivo coding of titles, specifically targeting the identification of the most influential drivers shaping wine tourism experiences. The rationale behind this approach lies in the observation that titles often encapsulate the the elements (or drivers) of the experience that impressed visitors the most and were most memorable. Through this process, we derived a set of seven distinct codes. Notably, one of these codes – related to "food" – was subsequently excluded from our analysis due to its infrequent occurrence (constituting less than 1% of mentions). However, it is essential to recognize that the significance of food as a factor varies across different contexts. For instance, in the specific context of our study, the winery did not offer full meals; instead, appetizers accompanied the wine tasting. This stage directly aligns with our primary research objective: the identification of drivers contributing to memorable wine tourism experiences.
4) Data coding: In the process of manual data coding, each review was treated as an individual case, including its title. To prevent redundancy, we selectively coded title content only if it provided information not already present in the body text. Employing a predetermined system of categories and codes, we utilized the categories identified in the preceding stage: wine, people, winery, tour, setting, and tasting), while the codes were based on Pine and Gilmore's 4 E's model of consumer experiences (educational, entertainment, aesthetic, escapist) [1]. For each of these four codes, we applied specific inclusion criteria. The *educational* dimension was discerned through reports of acquiring new knowledge without the ability to influence the event. Segments of text were categorized as *entertainment* if they explicitly referenced visitors having fun, such as "tried so many locally produced wines, very interesting and entertaining" (Ivaylo K, Jan 2016). Similarly, to qualify as *aesthetic*, a text segment needed to exhibit clear evidence of either 1) enjoying the visual beauty of the setting or 2) appreciating the quality of the wine. The *escapist* experience involves venturing into an environment distinct from the everyday (work and home). In alignment with Pine and Gilmore's definition [1], a text segment was coded as *escapist* if it demonstrated: 1) immersion in the environment/event (physically, emotionally, or cognitively), and 2) active participation (where the visitor could influence the environment/event). During the coding process, we introduced a new dimension – the *hedonic* aspect – for the wine category. Instances where a specific experience driver was mentioned positively but did not meet the aforementioned criteria (e.g., "the guide was excellent") were categorized as general. The aim of this additional coding, which is not connected to the experience dimensions, was to quantify the salience of the wine experience drivers. This stage is linked to the second research objective – it identifies the links between the drivers of wine tourism experiences and the 4Es of Pine and Gilmore's model [13].
5) Quantification of Results: Calculating Category and Code Frequencies. In this stage, we quantified the results by calculating the frequency of categories and codes as a percentage of the total cases. Specifically, we identified the proportion of reviews that mentioned the respective category or code. Throughout this process, as in the preceding two stages, we utilized MaxQDA for data processing.
6) In-depth qualitative analysis of coded segments for a deeper insight.

3.3. Data collection

The data for this study was collected from TripAdvisor, a platform chosen for its high degree of reliability and widespread popularity, ensuring a substantial volume of reviews [58,59]. Specifically, we focused on

Table 1. Reviewers' profile.

Gender			
Value	Frequency	Total percent	Valid percent
male	53	38.7%	50.5%
female	52	38.0%	49.5%
Total	105	77.0%	100.0%
Type of party			
Value	Frequency	Total percent	Valid percent
solo	7	5.1%	5.6%
couple	49	35.8%	39.5%
friends	46	33.6%	37.1%
family	16	11.7%	12.9%
business	6	4.4%	4.8%
Total	124	91.0%	100.0%
Country of origin			
Bulgaria	41	29.9%	38.0%
Abroad	67	49.1%	62.0%
Total	108	79%	100%

reviews related to Villa Melnik, a winery located in Bulgaria. The selection was based on two key factors:

1. Positive Reviews: Villa Melnik boasts predominantly positive reviews, including 168 "excellent," 9 "very good," 1 "average," only 1 "poor," and no "terrible" ratings.
2. Global Recognition: The winery consistently ranked among the top 100 world's best vineyards for the years 2020, 2021, and 2022 [9].

Founded in 2013, Villa Melnik is a relatively new family-owned establishment with a strong emphasis on wine tourism. The vineyards and the winery itself are situated in the picturesque region of Melnik, in southwest Bulgaria, in an area with centuries-old traditions in wine-making and a signature local variety – the Broadleaved Melnik and its siblings, of which the most popular is Melnik 55, also known as Early Melnik. Bulgaria as a wine destination, and the region around Melnik in particular are a typical example of an emerging wine destination from the Eastern (post-socialist) bloc.

A total of **179 reviews** spanning the period from **June 2013 to May 2022** were available for analysis. Among these, only reviews written in English and providing at least an average rating were imported into MaxQDA, resulting in **137 cases** that included both the full review texts and their corresponding titles. Additional information related to reviewers' country of origin, type of party (solo, friends, family, couple, business), and gender was also collected. Reviewers were evenly distributed by gender, and most of them travelled as a couple or with friends (40 and 37 valid percent respectively), followed by families (13%), while solo and business travellers accounted for about 5% each. About one-third were domestic visitors, while international ones came from countries on almost every continent, including UK, USA, Canada, Israel, The Netherlands, France, Germany, Australia, Spain, Switzerland, Turkey, Brazil and others.

4. RESULTS

In the initial stage of our study, we conducted open coding exclusively on the review titles. The objective was to identify the most prominent supply-driven factors influencing the wine tourism experience. Through this process, we identified seven key drivers: wine, winery, people, tour, tasting, setting, and food, which closely align with the winescape attributes previously identified in scholarly research [33,34,60]. However, it is noteworthy that the category of food emerged in only 0.7% of all cases. Subsequent analysis failed to yield significant evidence supporting its inclusion in the model. This finding can be attributed to the specific context of our study – the examined winery primarily offers food as appetizers accompanying tastings, rather than full-fledged meals. Consequently, we opted to exclude food from further consideration.

While we quantified these results (as depicted in Figure 1), their primary purpose lies in delineating the categories that will inform the subsequent stages of our investigation. The ultimate significance of each of these factors in shaping a memorable tourist experience was established through comprehensive coding of the full review texts.

4.1. Factors shaping the wine tourism experience

In the second stage of the study, a framework coding procedure was applied, using the themes identified in the previous stage as categories and the four dimensions of the customer experience (educational, entertainment, aesthetic and escapist) as codes. As explained in the research design section, an additional code was included for each category to signify mentions that do not fall into any of the four experience realms, but indicate importance to creating a memorable experience.

As evident form the results presented in Table 2, the most salient factor (mentioned in 80% of all reviews) for a memorable tourist experience is people, or in other words, the quality of service and communication with the winery staff and its owners. Not surprisingly, the wine category comes second in importance, followed by

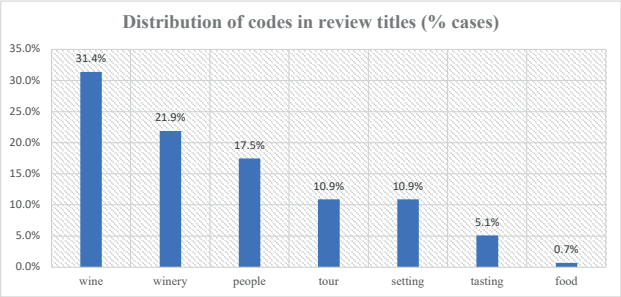


Figure 1. Distribution of codes in review titles (% cases).

the winery tour, the winery itself (which is mainly commented in terms of design, architecture and facilities), the setting and the tasting.

More insight on the potential of these drivers to deliver a compelling customer experiences was gained by an in-depth analysis of their experience dimensions.

4.2. Dimensions of the wine tourism experience

After identifying the core drivers of memorable wine tourism experience (People, Wine, Tour, Winery, Setting, Tasting), additional coding was carried out to determine their relationship to the four experience realms of Pine and Gilmore [1]. In addition to the quantified data presented in Table 3, an in-depth qualitative analysis was carried out, the results of which are presented in the next few paragraphs.

4.3.1. People

The category of "people" was identified as the most powerful driver for compelling wine tourism experiences, which is evidenced not only by the high level of saliency (80.3%), but also by direct reference by visitors:

> This is the best winery visit we have ever experienced. Not once has any winery owner sat down with us to explain in detail his winery operations and his business philosophy. We started the winery tour with very warm welcome from a wonderful lady who spoke excellent English, and later owner Nikola joined us. His hospitality was amazing, and he made our tour very special. (8snowflake8, Oct 2016)

Interaction with winery staff and owners is associated with three dimensions of the experience - escapist, educational and entertainment, with the escapist being the most pronounced one, mentioned in 67.2% of all cases/reviews (Table 2). There are several features that should be present to create a memorable escapist experience. First of all, a warm and proactive welcome encourages people to more active engagement and is critical for creating an escapist experience:

> We were very surprised when we stop and one young lady came immediately to welcoming us. She proposed us to show the winery and a small tasting of wines. It was amazing and very interesting. (Bogdana B, Nov 2015)
> A friendly welcome, informative tour & tasting from enthusiastic staff. We will be transported back to this beautiful spot whenever we enjoy the selection of wines we bought here. (customerexpert, July 2016)

In a broader context, it is the overall friendly attitude that predisposes to more open communication (active participation) and connects the visitor to the place (immersion). The experience becomes even more special, if the visitor has the chance to interact with the winery owners:

> Then, we sat down with the extremely hospitable winery owners and had great wine and terrific conversation. Coming from California, this kind of an experience where the owners engage and share their wine with you on such a personal level is unique and very special, an experience we will never forget. (Lisa S, June 2015)

In certain cases, this sense of connection can be as intense as feeling like a family:

Table 2. Frequency distribution of categories and codes (drivers and dimensions of the wine tourism experience).

Category	Count	% Cases	Code	Count	% Cases
people	128	80.3%	escapist	93	67.2%
			education	23	16.8%
			general	10	7.3%
			entertainment	2	1.5%
wine	107	70.1%	aesthetic	91	65.7%
			hedonic	11	8.0%
tour	82	59.1%	educational	46	33.6%
			general	28	20.4%
			entertainment	5	3.6%
			escapist	3	2.2%
winery	51	35%	aesthetic	38	27.7%
			general	13	9.5%
setting	44	32.1%	aesthetic	44	32.1%
tasting	34	24.8%	general	25	18.2%
			educational	9	6.6%

> And what I like people are polite and not extravagant – which makes you feel very fast like with family. (Gabriel, Aug 2017)

Another feature that has a pronounced impact is passion, which captivates the visitor and enhances the feeling of immersion. In addition, this quality causes a desire for closer, more personal communication (friendly relations), witnessed in one of the reviews through the commenter regretting that he did not ask for the name of the wine guide.

> "I've been to many wine tastings and it's easy to tell when the exhibitor is only working and when there's passion involved, which is this case… I regret not asking the name of the young lady who guided us through the winery, very professional and wine enthusiast! Thanks for the experience!" (Gustavo, Dec 2017)

The educational dimension is expressed mainly through comments on the guide's knowledge, which often refers not only to wine, but also to being able to provide information about the region and its history:

> Our guide was so warm and welcoming; she spoke amazing English and had so much information about the winemaking process and the history of the region. (customer-expert, July 2016)

The entertainment dimension is very poorly represented – references to it are found in only 1.5% of cases, identified through the guide/owner being described as funny or entertaining.

4.2.2. Wine

As a category, wine is mentioned in 70% of all cases, which is a significant level of salience. To identify the experience dimensions it can provide, a further coding was implemented, under the following criteria:

All text segments that denoted aesthetic appreciation, i.e. evaluation of the wine's quality, which is intersubjective, or as Burnham defines it: "valid with reference to a group of tasters who share competencies and experiences" [57, p. 12], were coded as aesthetic. This resulted in a share of 65.7% of all cases, which makes the aesthetic dimension the most pronounced one for this category. The following text segment depicts this dimension, at the same time emphasizing the link between local wine and culture:

> Yes, this are wines to move you! Of course they are solid, balanced, nuanced. They tell the sweeping story of on old culture and unforgettable nature. (Pepina Mac, August 2020)

For this category, no examples of the educational, entertainment or the escapist realm were found.

All instances where wine was mentioned only in terms of its taste (tasty or delicious) were coded as hedonic. Such references were found in only 8% of all cases.

4.2.3. Tour

The winery tour, along with the tasting, is one of the central elements of the tourist experience. According to the analysed reviews, the main dimension it delivers is the educational one (33.6% of all cases), but although with a lower share, the entertainment and escapist dimensions were also registered, with 3.6% and 2.2% respectively. The main emphasis is on the tour being informative and interesting, which is considered a very effective way to introduce the visitor to the entire winemaking process:

> The tour is informative and interesting, and takes you through the whole process--I've visited a number of wineries (California, Virginia), and this was the most thorough and engaging tour I've had. (Alexandra, February 2020)

Consistent with Pine and Gilmore's criteria for the four realms of experience, as well as the common practice in wine experience research, grape picking was coded as escapist (active participation and immersion): "… the tour was very good, amazing experience! We had the opportunity to pick up grapes and try them" (Vili Popova9, August 2015). In some cases, however, visitors described it as an entertaining experience: "…then we went to pick up grape, that was the most funny part" (Viktoria P, August 2015).

4.2.4. Winery

In reviews, the winery was mainly discussed in terms of its design and modern facilities:

> Plus the winery itself is beautiful, with fresh new décor. (thetravelingl, Nov 2015)
> Beautiful constructed with top notch equipment. (Richard S, Oct 2014)

All text segments with reference to the appeal of the building, the equipment or the interior design were cod-

ed as aesthetic and these were registered in 22.7% of all cases.

4.2.5. Setting

The setting, or more specifically the beauty of the area in which the winery is located, is one of the first things that impresses the visitor and accordingly affects their overall experience. "*At first, the winery gets you with its location - the extremely picturesque road to it, the white winery below a hill with a 180 degrees + view.*" (Aleksandra A, Sep 2015). It is mentioned in about one-third of all cases and is only associated with the aesthetic dimension. There are two types of references: the road to the winery, with the natural beauty of the winescape, and the well-maintained vineyards, and the view from the winery:

> And last but not least, the views! We were lucky to visit the place at sunset, which was really beautiful and a perfect finish of the whole day of travelling! The view from the winery, on rolling hills and little village is beautiful, reminding me of the Italian Tuscany. The region of Melnik is very pretty and the village itself a real gem. (George N, May 2022)

4.2.6. Tasting

Tasting is usually considered one of the main elements of the wine experience, but surprisingly, in this study it has the lowest degree of salience - only 24.8% of all cases. One necessary clarification that probably explains this result is that wine and tasting are separated here – under tasting in the present study only the process of wine presentation is considered, while wine as a product is the subject of a separate category. In the context of the studied winery, the tasting is an educational experience with an emphasis on the opportunity to obtain detailed information about each of the wines:

> We tasted a few of their best wines in different classes. She told us in detail about every one of them. It was a very unique experience and we loved it - and, of course, we left with a lot of wines. (Yoanisimus, February 2016)

5. DISCUSSION

The study has identified six major supply-driven factors for memorable wine tourism experiences: people, wine, winery, tour, setting, and tasting. Two of them (people and tour) were found to deliver more than one experience dimension, and one more – the tasting, probably has the same potential, but it was not realized in the specific context (Figure 2).

Consistent with some previous research [29,49], winery staff and owners were identified as the most significant factor in memorable experiences. Social interaction and conviviality are particularly important for co-creative tourism experiences [48,49,61,62], but until now they have not been associated with the escapist experience dimension. We argue that interaction with winery staff is an escapist experience because it meets both of the criteria set forth by Pine and Gilmore [1]: 1) it is active in nature, i.e. the visitor has the opportunity to directly affect it, and 2) it has an immersive character, realized by creating a connection with the place. The latter has also been demonstrated in previous studies [29], [63], where this connection is of particular importance for a memorable experience. The opportunity to encounter the winegrower has also been identified as one of the major factors for shaping an authentic experience [48].

There are three features of staff behaviour that facilitate the escapist dimension – warm and proactive welcome, friendly and polite attitude, and passion for their job. All these were also identified as very important by Charters et al. [29], who also emphasize the role of sharing a story or a myth for stronger engagement. In this study, there were several mentions of storytelling, mainly related to family narratives and stories connect-

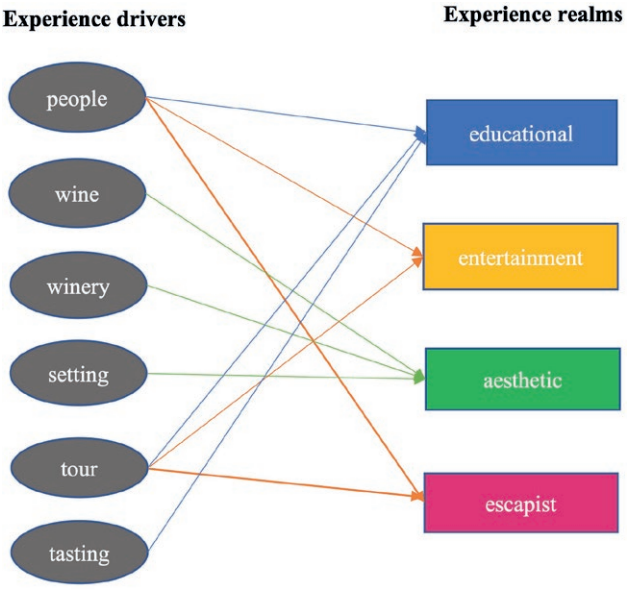


Figure 2. Links between experience drivers and the four experience realms.

ed to special circumstances in the wine-making process, e.g. a hailstorm that was used as to highlight a special wine edition.

At the same time, the present findings are in stark contrast with the vast majority of research that focuses on the relationship between the elements of the tourism offer. With only a few exceptions [48], in these studies the staff (or interaction with staff members) is not explicitly present and the escapist dimension is almost absent.

The other two experience dimensions that are associated with winery staff are the educational and entertainment, but they are much less represented. In terms of the educational experience, it is important not only to share detailed information about the wines, but also about the culture and history of the entire region.

The second most important driver of memorable experiences is wine. Similar to previous studies [36,46,64], it is mainly connected with the aesthetic dimension, expressed through appreciation of its qualities, special / local character, and is strengthened by the presence of international awards. The latter may be associated with the notion of cool authentication, introduced by Cohen and Cohen [65], which denotes a process through which the authenticity of a tourist attraction (in this case the quality of wine) is confirmed through an external authority, rather than by the people involved in the process or phenomenon (in this case the visitors tasting the wines). The aesthetic dimension of wine consumptions seems to be neglected in scientific research so far, although it was registered as early as 2005 in a study by Charters [66], where results indicate that consumers recognize certain parallels between the enjoyment of wine and the appreciation of artistic expressions. These commonalities encompass the shared pleasure derived from both experiences, the interconnected influence of sensory, emotional, and cognitive responses, the emphasis on evaluative processes, and the subjective nature of personal preferences. The purely hedonic dimension of wine tasting was also registered, but it was much less pronounced – only 8% of all cases.

The aesthetic dimension is also related to the winery and the setting. The main feature commented on in terms of the winery's aesthetic impact is its modernity – both in terms of design and facilities. The architecture and appeal of the winery is in a certain sense connected to the setting – after all, it is an integral part of the general landscape. In previous studies, the aesthetic dimension has been broadly linked to "consuming the landscape" [46], enjoying a pleasant environment" [48], or "contemplating the architecture" [64].

The winery tour and the tasting are the two most common activities when visiting a wine cellar. Whether they will facilitate a combination of experience dimensions or not is to a great extent a matter of service design and delivery. In line with previous research [36,46,64], these were mostly associated with education, but future studies (in a different context) could also identify a greater share of the entertainment dimension.

6. CONCLUSION

The paper proposes a model that builds upon the existing ones by utilizing consumer feedback to identify both the drivers of memorable wine tourism experiences and their potential to deliver each of the four experience dimensions as identified by Pine and Gilmore [1].

Identifying the sources of the different experience dimensions is of great value to the wine business, as it allows to model the experience and ultimately – to achieve a higher level of customer satisfaction. The present findings suggest a pronounced focus on people (winery staff and owners), who are the most powerful driver of memorable experiences and have the potential to deliver at least three dimensions: the escapist, the educational, and entertainment. The quality and authenticity of wines are of almost equal importance, but are limited to the aesthetic and hedonic experience dimensions.

The winery tour and the tasting are the stage where the full potential of people and wines can be utilized. In the present case, their design has led to mainly educational and to a lesser extent entertainment experiences, which speaks of unused opportunities. Increasing the entertainment aspect and combining it with adequately presented information about the winery, the local wines and the region as a whole would lead to the so-called edutainment, and ultimately, to a more complex and memorable tourist experience. Previous studies have identified the following activities as potential drivers for entertainment experiences: wine events [4,43,44], concerts [36,46], wine blending [36,46], tasting in vineyards [43], museum and heritage site visits [36,46], farm and food demonstrations [36,46]. The purely visual aspect of aesthetics is delivered through the setting and the winery design and delivery. Features that are highly valued by visitors include preserved natural beauty of the region, vineyard landscapes, attractive winery architecture and modern, well-maintained facilities.

The main theoretical implication of this study is related to the new model of the relationship between the architectural elements and the dimensions of the wine tourism experience. In most studies so far, the potential of the visitor-staff interaction to deliver an escapist experience was largely neglected. From a practical point

of view, the findings can offer guidance to wineries, and related businesses on how to enhance the overall visitor experience by designing wine tourism products that deliver the sweet spot of customer experience – a combination of all four experience dimensions.

The study has been focused on a single case – a family-owned winery in Bulgaria, in order to showcase the specifics of a particular context, which however also means the findings may not be fully applicable to other contexts. Future research is needed to identify context-specific differences referring to different types of wineries or wine regions. This would help to establish whether the drivers of memorable experiences have the same influence in different settings and if they are related to the same experience dimensions. It would also be interesting to identify the manifestation of experience drivers and their relation to the 4Es for different visitor segments.

REFERENCES

[1] B. J. P. Pine and J. H. Gilmore, *The Experience Economy*, Revised edition. Boston, Massachusetts: Harvard Business Review Press, 2019.

[2] D. L. Quadri-Felitti and A. M. Fiore, "Destination loyalty: Effects of wine tourists' experiences, memories, and satisfaction on intentions," *Tourism and Hospitality Research*, vol. 13, no. 1, pp. 47–62, Jan. 2013, https://doi.org/10.1177/1467358413510017

[3] T. Fernandes and M. Cruz, "Dimensions and outcomes of experience quality in tourism: The case of Port wine cellars," *Journal of Retailing and Consumer Services*, vol. 31, pp. 371–379, Jul. 2016, https://doi.org/10.1016/j.jretconser.2016.05.002

[4] A. Madeira, A. Correia, and J. A. Filipe, "Modelling wine tourism experiences," *Anatolia*, vol. 30, no. 4, pp. 513–529, Oct. 2019, https://doi.org/10.1080/13032917.2019.1642922

[5] J.-H. Kim, J. R. B. Ritchie, and V. W. S. Tung, "The Effect of Memorable Experience on Behavioral Intentions in Tourism: A Structural Equation Modeling Approach," *Tourism Analysis*, vol. 15, no. 6, pp. 637–648, Dec. 2010, https://doi.org/10.3727/108354210X12904412049776

[6] C. Massa and S. Bédé, "A consumer value approach to a holistic understanding of the winery experience," *Qualitative Market Research: An International Journal*, vol. 21, no. 4, pp. 530–548, Jan. 2018, https://doi.org/10.1108/QMR-01-2017-0031

[7] G. D. Chiappa, J. C. Martin, and C. Román, "Developing wine tourism experiences. A discrete choice analysis using best-worst scaling data," *Wine Economics and Policy*, vol. 11, no. 1, Art. no. 1, May 2022, https://doi.org/10.36253/wep-9946

[8] G. Papadopoulou and M. Alebaki, "Capturing core experiential aspects in winery visitors' TripAdvisor reviews: Netnographic insights from Santorini and Crete," in *Routledge Handbook of Wine Tourism*, Routledge, 2022.

[9] "World's Best Vineyards," IWC - The World's Best Vineyards. Accessed: Dec. 29, 2022. [Online]. Available: https://www.worldsbestvineyards.com

[10] A. Y. K. Chua and S. Banerjee, "Customer knowledge management via social media: the case of Starbucks," *Journal of Knowledge Management*, vol. 17, no. 2, pp. 237–249, Jan. 2013, https://doi.org/10.1108/13673271311315196

[11] V. Taecharungroj and B. Mathayomchan, "Analysing TripAdvisor reviews of tourist attractions in Phuket, Thailand," *Tourism Management*, vol. 75, pp. 550–568, Dec. 2019, https://doi.org/10.1016/j.tourman.2019.06.020

[12] B. J. P. II and J. H. Gilmore, *The Experience Economy: Work Is Theater & Every Business a Stage*, 1st edition. Boston: Harvard Business School Press, 1999.

[13] Pine, Joseph B. and J. H. Gilmore, "Welcome to the Experience Economy," *Harvard Business Review*, Jul. 01, 1998. Accessed: Dec. 26, 2022. [Online]. Available: https://hbr.org/1998/07/welcome-to-the-experience-economy

[14] F. Gouillart, "Experience Co-creation," *Harvard Business Review*, Apr. 18, 2011. Accessed: Dec. 26, 2022. [Online]. Available: https://hbr.org/2011/04/experience-co-creation

[15] A. Helkkula, "Characterising the concept of service experience," *Journal of Service Management*, vol. 22, no. 3, pp. 367–389, Jan. 2011, https://doi.org/10.1108/09564231111136872

[16] H. Schallehn, S. Seuring, J. Strähle, and M. Freise, "Defining the antecedents of experience co-creation as applied to alternative consumption models," *Journal of Service Management*, vol. 30, no. 2, pp. 209–251, Jan. 2019, https://doi.org/10.1108/JOSM-12-2017-0353

[17] R. Verganti, "Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda*," *Journal of Product Innovation Management*, vol. 25, no. 5, pp. 436–456, 2008, https://doi.org/10.1111/j.1540-5885.2008.00313.x

[18] H. Kim and K. K. F. So, "Two decades of customer experience research in hospitality and tourism: A bibliometric analysis and thematic content analysis," *International Journal of Hospitality Manage-*

ment, vol. 100, p. 103082, Jan. 2022, https://doi.org/10.1016/j.ijhm.2021.103082

[19] A.-M. Lebrun, C.-J. Su, and P. Bouchet, "Domestic tourists' experience in protected natural parks: A new trend in pandemic crisis?," *Journal of Outdoor Recreation and Tourism*, vol. 35, p. 100398, Sep. 2021, https://doi.org/10.1016/j.jort.2021.100398

[20] F. Ali, K. Hussain, and N. A. Ragavan, "Memorable Customer Experience: Examining the Effects of Customers Experience on Memories and Loyalty in Malaysian Resort Hotels," *Procedia - Social and Behavioral Sciences*, vol. 144, pp. 273–279, Aug. 2014, doi: https://doi.org/10.1016/j.sbspro.2014.07.296

[21] M. Mehmetoglu and M. Engen, "Pine and Gilmore's Concept of Experience Economy and Its Dimensions: An Empirical Examination in Tourism," *Journal of Quality Assurance in Hospitality & Tourism*, vol. 12, no. 4, pp. 237–255, Oct. 2011, https://doi.org/10.1080/1528008X.2011.541847

[22] M. Mahdzar, I. Rahayu, and A. Abdul Gani, "Effects of Visitors Experience on Satisfaction and Intentions to Recommend in Malaysian Museum," *World Applied Sciences Journal*, vol. 35, Dec. 2017, https://doi.org/10.5829/idosi/wasj.seiht.2017.59.64

[23] H. Oh, A. M. Fiore, and M. Jeoung, "Measuring Experience Economy Concepts: Tourism Applications," *Journal of Travel Research*, vol. 46, no. 2, pp. 119–132, Nov. 2007, https://doi.org/10.1177/0047287507304039

[24] R. Garibaldi and F. Sfodera, "TECHNOLOGIES FOR ENHANCING WINE TOURISM EXPERIENCE," 2020, pp. 409–417.

[25] J. Bruwer and K. Alant, "The hedonic nature of wine tourism consumption: An experiential view," *International Journal of Wine Business Research*, vol. 21, pp. 235–257, Aug. 2009, https://doi.org/10.1108/17511060910985962

[26] T. Danielmeier and J. N. Albrecht, "Architecture and Future Food and Wine Experiences," in *The Future of Food Tourism: Foodies, Experiences, Exclusivity, Visions and Political Capital*, Channel View Publications, 2015, pp. 87–100. https://doi.org/10.21832/9781845415396-010

[27] J. Bruwer and E. Rueger-Muck, "Wine tourism and hedonic experience: A motivation-based experiential view," *Tourism and Hospitality Research*, vol. 19, no. 4, pp. 488–502, Oct. 2019, https://doi.org/10.1177/1467358418781444

[28] H. Kim and M. A. Bonn, "Authenticity: Do tourist perceptions of winery experiences affect behavioral intentions?," *International Journal of Contemporary Hospitality Management*, vol. 28, no. 4, pp. 839–859, Jan. 2016, https://doi.org/10.1108/IJCHM-05-2014-0212

[29] S. Charters, J. Fountain, and N. Fish, "'You Felt Like Lingering…': Experiencing 'Real' Service at the Winery Tasting Room," *Journal of Travel Research*, vol. 48, no. 1, pp. 122–134, Aug. 2009, https://doi.org/10.1177/0047287508326508

[30] A. S. Kotur, "A bibliometric review of research in wine tourism experiences: insights and future research directions," *International Journal of Wine Business Research*, vol. ahead-of-print, no. ahead-of-print, Jan. 2023, https://doi.org/10.1108/IJWBR-07-2022-0024

[31] I. Leri and P. Theodoridis, "The effects of the winery visitor experience on emotions, satisfaction and on post-visit behaviour intentions," *Tourism Review*, vol. 74, no. 3, pp. 480–502, Jan. 2019, https://doi.org/10.1108/TR-07-2018-0092

[32] K. Lee, M. Madanoglu, and J.-Y. Ko, "Exploring key service quality dimensions at a winery from an emerging market's perspective," *British Food Journal*, vol. 118, no. 12, pp. 2981–2996, Jan. 2016, https://doi.org/10.1108/BFJ-04-2016-0157

[33] V. A. Quintal, B. Thomas, and I. Phau, "Incorporating the winescape into the theory of planned behaviour: Examining 'new world' wineries," *Tourism Management*, vol. 46, no. C, pp. 596–609, 2015, Accessed: Feb. 03, 2022. [Online]. Available: https://ideas.repec.org/a/eee/touman/v46y2015icp596-609.html

[34] J. Bruwer and M. J. Gross, "A Multilayered Macro Approach to Conceptualizing the Winescape Construct for Wine Tourism," *Tourism Analysis*, vol. 22, no. 4, pp. 497–509, Nov. 2017, https://doi.org/10.3727/108354217X15023805452059

[35] I. Terziyska and R. Damyanova, "Winescape through the lens of organized travel – a netnography study," *International Journal of Wine Business Research*, vol. 32, no. 4, pp. 477–492, Jan. 2020, https://doi.org/10.1108/IJWBR-09-2019-0050

[36] V. R. Santos, P. Ramos, N. Almeida, and E. Santos-Pavón, "Wine and wine tourism experience: a theoretical and conceptual review," *Worldwide Hospitality and Tourism Themes*, vol. 11, no. 6, pp. 718–730, Jan. 2019, https://doi.org/10.1108/WHATT-09-2019-0053

[37] R. Capitello, L. Agnoli, and D. Begalli, "A NEW APPROACH TO THE ANALYSIS OF VISITOR PERCEPTIONS TOWARDS A TOURISM DESTINATION: THE ROLE OF FOOD AND WINE EXPERIENCES," *Scientific Papers Series Manage-*

ment , Economic Engineering in Agriculture and Rural Development, vol. 13, pp. 57–64, Jan. 2013.

[38] E. Cohen and L. Ben-Nun, "The Important Dimensions of Wine Tourism Experience from Potential Visitors' Perception," *Tourism and Hospitality Research*, vol. 9, no. 1, pp. 20–31, Jan. 2009, https://doi.org/10.1057/thr.2008.42

[39] C. Hall and R. Mitchell, "The tourist terroir of New Zealand wine: The importance of region in the wine tourism experience," *Food and Environment: Geographies of Taste*, pp. 69–91, Jan. 2002.

[40] A. Brochado, O. Stoleriu, and C. Lupu, "Wine tourism: a multisensory experience," *Current Issues in Tourism*, vol. 24, no. 5, pp. 597–615, Mar. 2021, https://doi.org/10.1080/13683500.2019.1649373

[41] A. Brochado, M. Troilo, H. Rodrigues, and F. Oliveira-Brochado, "Dimensions of wine hotel experiences shared online," *International Journal of Wine Business Research*, vol. 32, no. 1, pp. 59–77, Jan. 2019, https://doi.org/10.1108/IJWBR-12-2018-0072

[42] L. Roberts and B. Sparks, "Enhancing the wine tourism experience: the customers' viewpoint.," *Global wine tourism: research, management and marketing*, pp. 47–55, 2006, Accessed: Jan. 21, 2023. [Online]. Available: https://www.cabdirect.org/cabdirect/abstract/20063180785

[43] B. Pikkemaat, M. Peters, P. Boksberger, and M. Secco, "The Staging of Experiences in Wine Tourism," *Journal of Hospitality Marketing & Management*, vol. 18, no. 2–3, pp. 237–253, Feb. 2009, https://doi.org/10.1080/19368620802594110

[44] T. Vo Thanh and V. Kirova, "Wine tourism experience: A netnography study," *Journal of Business Research*, vol. 83, pp. 30–37, Feb. 2018, https://doi.org/10.1016/j.jbusres.2017.10.008

[45] B. J. Pine, Joseph B. and J. H. Gilmore, *The Experience Economy, Updated Edition*, Updated edition. Boston, Mass: Harvard Business Review Press, 2011.

[46] D. Quadri-Felitti and A. M. Fiore, "Experience economy constructs as a framework for understanding wine tourism," *Journal of Vacation Marketing*, vol. 18, no. 1, pp. 3–15, Jan. 2012, https://doi.org/10.1177/1356766711432222

[47] R. Oldenburg, *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*, 3rd edition. New York : Berkeley, Calif.: Da Capo Press, 1999.

[48] C. Haller, I. Hess-Misslin, and J.-P. Mereaux, "Aesthetics and conviviality as key factors in a successful wine tourism experience," *International Journal of Wine Business Research*, vol. 33, no. 2, pp. 176–196, Jan. 2020, https://doi.org/10.1108/IJWBR-12-2019-0063

[49] M. Carvalho, E. Kastenholz, and M. J. Carneiro, "Interaction as a Central Element of Co-Creative Wine Tourism Experiences—Evidence from Bairrada, a Portuguese Wine-Producing Region," *Sustainability*, vol. 13, no. 16, Art. no. 16, Jan. 2021, https://doi.org/10.3390/su13169374

[50] E. Kastenholz, D. Cunha, A. Eletxigerra, M. Carvalho, and I. Silva, "The Experience Economy in a Wine Destination—Analysing Visitor Reviews," *Sustainability*, vol. 14, no. 15, Art. no. 15, Jan. 2022, https://doi.org/10.3390/su14159308

[51] D. Krech and R. S. Crutchfield, "Beliefs and attitudes of men," in *Theory and problems of social psychology*, New York, NY, US: McGraw-Hill, 1948, pp. 149–174, https://doi.org/10.1037/10024-005

[52] R. J. Callan and L. Bowman, "Selecting a hotel and determining salient quality attributes: a preliminary study of mature british travellers," *International Journal of Tourism Research*, vol. 2, no. 2, pp. 97–118, 2000, https://doi.org/10.1002/(SICI)1522-1970(200003/04)2:2<97::AID-JTR190>3.0.CO;2-1

[53] I. P. Tussyadiah and F. Zach, "Identifying salient attributes of peer-to-peer accommodation experience," *Journal of Travel & Tourism Marketing*, vol. 34, no. 5, pp. 636–652, Jun. 2017, https://doi.org/10.1080/10548408.2016.1209153

[54] S. Pike, F. Kotsi, and V. Tossan, "Stopover destination image: A comparison of salient attributes elicited from French and Australian travellers," *Journal of Destination Marketing & Management*, vol. 9, pp. 160–165, Sep. 2018, https://doi.org/10.1016/j.jdmm.2018.01.002

[55] E. Barbierato, I. Bernetti, and I. Capecchi, "Analyzing TripAdvisor reviews of wine tours: an approach based on text mining and sentiment analysis," *International Journal of Wine Business Research*, vol. 34, no. 2, pp. 212–236, 2022, v10.1108/IJWBR-04-2021-0025

[56] T. Vo Thanh and V. Kirova, "Wine tourism experience: A netnography study," *Journal of Business Research*, vol. 83, no. Complete, pp. 30–37, 2018, https://doi.org/10.1016/j.jbusres.2017.10.008

[57] D. Burnham and O. Skilleas M., *The Aesthetics of Wine*. Chichester, UK: Wiley-Blackwell, 2012. Accessed: Jan. 30, 2023. [Online]. Available: https://www.wiley.com/en-ie/The+Aesthetics+of+Wine-p-9781118323878

[58] A. Chua and S. Banerjee, "Reliability of Reviews on the Internet: The Case of TripAdvisor," *undefined*, 2013, Accessed: Feb. 03, 2022. [Online]. Available:

https://www.semanticscholar.org/paper/Reliability-of-Reviews-on-the-Internet%3A-The-Case-of-Chua-Banerjee/8fc16a4a6c950f11e1a922545ac1f5b8c91a34cb

[59] V. Taecharungroj and B. Mathayomchan, "Analysing TripAdvisor reviews of tourist attractions in Phuket, Thailand," *Tourism Management*, vol. 75, pp. 550–568, Dec. 2019, https://doi.org/10.1016/j.tourman.2019.06.020

[60] J. Bruwer, M. J. Gross, and H. C. Lee, "Tourism Destination Image (TDI) Perception Within a Regional Winescape Context," *Tourism Analysis*, vol. 21, no. 2–3, pp. 173–187, May 2016, https://doi.org/10.3727/108354216X14559233984692

[61] S. A. S. Rachão, Z. Breda, C. Fernandes, and V. Joukes, "Food-and-wine experiences towards co-creation in tourism," *Tourism Review*, vol. 76, no. 5, pp. 1050–1066, Jan. 2020, https://doi.org/10.1108/TR-01-2019-0026

[62] A. C. Campos, J. Mendes, P. O. do Valle, and N. Scott, "Co-creation of tourist experiences: a literature review," *Current Issues in Tourism*, vol. 21, no. 4, pp. 369–400, Mar. 2018, https://doi.org/10.1080/13683500.2015.1081158

[63] D. Paulauskaite, R. Powell, J. A. Coca-Stefaniak, and A. M. Morrison, "Living like a local: Authentic tourism experiences and the sharing economy," *International Journal of Tourism Research*, vol. 19, no. 6, pp. 619–628, 2017, https://doi.org/10.1002/jtr.2134

[64] M. M. Amaral, V. R. Kuhn, S. J. G. dos Anjos, and L. C. da S. Flores, "Experiences in a wine tourism destination from the visitors' perspective," *International Journal of Wine Business Research*, vol. ahead-of-print, no. ahead-of-print, Jan. 2023, https://doi.org/10.1108/IJWBR-05-2023-0028

[65] E. Cohen and S. Cohen, "Authentication: Hot and Cool," *Annals of Tourism Research*, vol. 39, pp. 1295–1314, Jul. 2012, https://doi.org/10.1016/j.annals.2012.03.004

[66] S. Charters and S. Pettigrew, "Is wine consumption an aesthetic experience?," *Journal of Wine Research*, vol. 16, no. 2, pp. 121–136, Aug. 2005, https://doi.org/10.1080/09571260500327663

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Perišić Prodan, M., Čuić Tanković, A., & Ritossa, N. (2024). Image, satisfaction, and continued usage intention in wine tourism through digital content marketing. *Wine Economics and Policy* 13(1): 33-47. doi: 10.36253/wep-15447

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Image, satisfaction, and continued usage intention in wine tourism through digital content marketing

Marina Perišić Prodan[1,*], Ana Čuić Tanković[1], Nikolina Ritossa[2]

[1] *University of Rijeka, Faculty of Tourism and Hospitality Management, Department of Marketing Primorska 46, P.P. 97, 51410 Opatija, Croatia*
[2] *Gaveia Ltd., Ulica rijeke Raše 7, 52446 Novigrad, Croatia*
E-mail: marinap@fthm.hr; anact@fthm.hr; uprava@gaveia.com
*Corresponding author.

Abstract. In the last decade, the rapid development of technology has increased the importance of the digital presence of service providers in wine tourism. The use of new digital technologies can help wine regions and service providers to improve the visitor experience and enhance the destination image. The purpose of this paper is to investigate the role of digital content marketing (DCM) in wine tourism and explore the importance of its dimensions on wine tourists' perceived image, satisfaction and behavioural intentions. The paper is based on desk and field research. An analysis of previous research was conducted and a survey was formed based on the previous research. The empirical study was conducted with a sample of 241 Croatian respondents, who have visited wine cellars and wine events in Istria in the last 5 years. Hypothesis testing was conducted using partial least squares structural equation modelling (PLS-SEM). The research results showed that usefulness, entertainment and quality of digital content had a statistically significant influence on perceived image, while entertainment and quality of digital content were significant predictors of overall satisfaction of wine tourists. Furthermore, a positive influence of perceived image and overall satisfaction with digital content on intention to continue using it was found. The study contributes to the understanding of wine tourists' behaviour in the digital environment and leads to implications that can be used for the development of digital marketing strategies to improve the wine tourism offer and to better respond to the contemporary demands of wine tourists.

Keywords: digital content marketing, perceived image, satisfaction, continued usage intention, wine tourism.

1. INTRODUCTION

The rapid development of digital technology, as well as rapidly growing competition, means that wine destinations are facing ever-increasing challenges to attract new visitors, but also to retain existing ones. To reach their target audience, service providers should develop and promote wine tourism and look for new ways to enhance the visitor experience [1]. Moreover, it is

crucial for both science and the wine industry to find out which factors influence wine tourists' satisfaction and their behavioural intentions [2]. Developing high-quality digital content that integrates physical, cultural and natural resources is now a strategic priority for wine service providers and wine destinations.

Wine tourism has become an important area of tourism in many countries around the world, associated with an eventful trip and providing an additional motivation to travel. Research shows that visiting wine destinations (especially wineries) leads to an increase in (direct) wine sales, customer education, and relationship building with them, providing long-term benefits to all stakeholders [3,4]. As a subcategory of gastronomic tourism [5], wine tourism refers to "visits to wineries, wine cellars, wine festivals, and wine exhibitions, where tasting grape wines and experiencing the characteristics of a wine region are the main motivating factors for visitors" [3, p.3]. Wine tourism has developed into an important facet of tourism in many countries around the world, characterized by a journey enriched with experiential elements. In scientific discourse, wine tourism is widely considered a prime area for the development of experiences, due to its association with sensory and hedonic dimensions [6, 7, 74]. Wine tourism experiences encompass a variety of activities that combine "landscapes, wines, gastronomy, culture, history, and human relations" [7] and allow visitors to forge deeper connections with the culture and heritage of the destination [8]. Due to its multisensory nature, the wine tourism experience is different for each tourist [9], as it encompasses not only wine-related products but also myriad facets of the winescapes [6]. Moreover, Santos [9, 74] emphasises that wine experiences are highly memorable experiences as they stimulate different senses, including the cultural, entertainment, aesthetic and escapist dimensions of the winescapes.

Thanks to a climate that favours the cultivation of vines, the wine industry of the Mediterranean region has been the most developed in Europe for many years. One of the most important sectors of agriculture in the Republic of Croatia is the wine sector [10], the income of which amounts to 626.00 million US dollars in 2023 and is expected to grow by 2.47 % annually until 2027 [11]. In terms of wine production, Croatia is divided into coastal and continental wine regions [12], with Istria, a peninsula in the northern part of the Adriatic Sea, positioned as the leading wine tourism destination [12, 13, 14]. Due to the increasing development of wine tourism offerings (e.g., wine cellars, wine routes, wine events, etc.), wine tourism has great potential for branding Croatia on the tourism market [15]. In the last decade, the number of wine tourists in the world has increased significantly [16]. Since visitors to wine regions are mostly domestic tourists, proximity to their place of residence has been identified as the crucial element for the prosperity of wine tourism [17]. In Croatia, demand growth is generated mainly by the local population based on gastro-ecological experiences, with Croatian citizens most frequently visiting wine routes and 61% of them buying local wines and 63% buying local food, while 53% of visitors order local wines in restaurants [13].

In recent years, digital content marketing (DCM) has become the fastest growing content marketing strategy [1]. This is supported by the fact that 90% of marketers actively used content marketing as part of their overall marketing strategy in 2022, an increase of 20% compared to 2019 [18]. While the importance of DCM has been acknowledged in industry sources, academic evidence remains limited [19]. Most recent research on DCM has focused on driving customer engagement, trust, and value [20,21,22,23], by emphasizing the importance of branded content marketing and loyalty [24,25]. Recent studies have provided valuable insights into DCM and consumer behaviour in various contexts, such as retail [26], financial services [27], business-to-business (B2B) contexts [28], and tourism [29,1]. Although the concept of DCM is receiving increasing attention in academia, there is a lack of empirical studies in the tourism context [29], especially in determining the relationship between DCM, perceived image, satisfaction and behavioural intentions.

This study aims to fill this gap by extending the existing knowledge to improve the understanding of the DCM concept and investigate its predictive power on the behavioural intentions of wine tourists in the Istria region, a leading wine tourism destination in the Republic of Croatia. Specifically, this study empirically investigates the influence of the key dimensions of DCM on the perceived image and satisfaction of wine tourists. It also examines how tourists' perceived image and satisfaction affect their intention to continue using digital content. It is expected that the findings will be of importance to the academic community to expand the knowledge of this current topic in the marketing literature, which may serve as an appropriate foundation for future research. In addition, the research findings may be useful in practice, particularly for wineries, but also for destination marketers in understanding wine tourists' satisfaction with digital content and their continued use of that content. In designing an innovative wine product in a digital environment, the study and application of an attractive content marketing strategy is crucial for both the academic community and the wine industry.

2. THEORETICAL FRAMEWORK

2.1. The framework of digital content marketing

Content marketing in the digital environment is defined as "a strategic marketing approach focused on creating and distributing valuable, relevant, and consistent content to attract and retain a clearly defined audience — and, ultimately, to drive profitable customer action" [30]. DCM focuses on creating and publishing high-quality content with the goal of increasing brand awareness [1] and driving consumer engagement [31]. In addition, DCM provides valuable information and/or entertaining content [25] that is not about selling products, as well as providing personalized services in real time [32, 19], which enables the building of long-term relationships [33] and adds value to current and potential customers [34,24]. Based on the literature, we define and explain the dimensions of DCM that influence the perceived image and satisfaction with digital content services: DC Usefulness, DC Entertainment and DC Quality.

As an important predictor of information technology satisfaction and future behavioural intentions [35], perceived usefulness can be explained as the extent to which a technology user believes that using a new technology will contribute to his or her productivity [36]. Joo and Sohn [37] state that digital content usefulness refers to how well and easily users use certain digital content. In the context of tourism, [38] state that DC usefulness can be seen as an anticipated outcome that tourists expect when searching for information and planning a trip, and is the main motivation for the adoption of information technology.

In the context of information and communication technology, entertainment is described as "the ability of the medium to meet the audience's needs for escapism, distraction, aesthetic enjoyment, or emotional release" [39, p. 759]. In attracting and retaining customers, it is especially important to create emotional and engaging experiences, primarily through the provision of entertaining content [25]. People who come across various photos, videos, reviews, and advertising campaigns can use them to satisfy their entertainment needs [40]. Companies tend to use entertaining content, especially on social networks, to create an emotional connection between the content and the audience, which promotes group identity and affirmation as well as motivation to share it [1,24].

In e-tourism settings, the fundamental factor for tourists' satisfaction is the quality of digital content, because higher quality of digital information improves users' experiences and emotions [41]. In the literature, information quality is described as "a function of the value of the output produced by a system as perceived by the user" [39, p. 758] or "the extent to which consumers perceive that the information content published by a company on its brand site is of high quality" [42, p. 16]. Information quality often depends on four key attributes [43]: (1) completeness, which indicates how thoroughly digital technologies provide all the information needed for customer service tasks; (2) accuracy, which indicates the correctness of the information provided by those technologies; (3) format, which refers to how the information is presented; and (4) currency, which refers to how up-to-date and new the information is.

2.2. Perceived image

Following the Qian et al. [44], who explained the differences between self-positioned image and perceived image in the hotel industry, this research refers to perceived image as the perception of digital content users. According to Wang [45], the perceived image of a gastronomy blog can help customers form an overall impression of a location, including a region's offerings, the quality of services, and the environment, suggesting that gastronomy blogs can help readers form an overall impression of a gastronomy location. Santos [9] and Tsai [46] emphasised that memorable tourism experiences can also be related to wine experiences and local food experiences. Before visiting, tourists use various sources of information to obtain as many data as possible and form a perceived image [47], with the Internet playing an increasingly important role and many traditional sources of information being used [48]. Because digital content marketing focuses on communication and not just on sales [1,49], digital content marketing allows users to view and rate various images and videos, learn about specific wine events and exhibitions, learn about the wine region, traditions, and production methods, and rate wine promotion topics. Previous research has included food elements in destination image scales [50], as well as a variable from forming taste awareness, which has a significant positive influence on consumers' behavioural intention [45]. Destination websites directly affect perceived image and create virtual experiences [51]. Therefore, perceived image can be transferred through real and online food and beverage experiences.

2.3. User satisfaction and behavioural intentions

As a central concept in marketing, satisfaction is usually considered as an antecedent of behavioural

intentions [52]. It can represent "the overall customer attitude toward the service provider" [53, p. 41] or the customer's emotional response resulting from the difference between his or her expectations and perceptions [54]. User satisfaction is higher when actual experiences are equal to or better than expected experiences. DCM has a direct impact on creating more participative and richer user experiences, which consequently leads to higher user satisfaction and, more importantly, to referral of digital content [55,29]. Based on Soltani-Nejad et al. [56] study, this paper considers user satisfaction as a cumulative feeling that occurs during the process of users' experiences and interactions with wine tourism digital content.

According to Oliver's [57] expectation - confirmation theory, if the product or service meets the user's expectations, the user's satisfaction will influence their intention to continue using it. In predicting users' future behaviour in the digital environment, intention to keep using is the most commonly employed measure of behavioural intention [58]. As the intensity of the user's willingness to continuously use a particular information system [59], this variable is most often determined by the user's attitudes [29], perceived quality and usefulness [35], and perceived enjoyment, i.e., entertainment [60]. Moreover, Mathew and Soliman [29] pointed out that customers' intentions to use digital content have a significant impact on their actual behaviour. Moreover, the importance of continued intention to use is recognized as a fundamental factor in the sustainability of websites and the retention of their users [52].

3. HYPOTHESES DEVELOPMENT AND MODEL SPECIFICATION

Digital content marketing must match the image perceived by consumers [61]. The usefulness of digital content can significantly influence visitors' perception of a destination [75,38]. In addition, entertaining elements of digital content can further enrich the user experience and positively influence their experience of the destination [40; 1]. Moreover, Jorge et al. [62] found that a website's perceived usefulness has a positive effect on destination image. Furthermore, Baber and Baber [76] emphasize that when shaping the destination image via social media platforms, digital content is a crucial factor that requires a mix of entertainment, usefulness (i.e. trending topics), customization and user engagement. Consistent with Bu et al. [1], who studied digital content marketing based on usefulness, information, entertainment, and quality of digital content, we expect digital content to help visitors develop a new or reinforced image of a particular wine region. Therefore, we assume that digital content usefulness and digital content entertainment are positively related to perceived image. Hence, we posit the following hypotheses (H):

H1: There is a statistically significant and positive relationship between digital content usefulness and perceived image.
H2: There is a statistically significant and positive relationship between digital content entertainment and perceived image.

Previous research has shown that digital content quality positively influences attitudes towards the destination and travel intentions [77]. Kullada and Kurniadjie [41] studied the impact of digital information quality on destination image and behavioural intentions. The research results revealed that the quality of digital information is a significant predictor of the formation of the perceived image of a destination and, consequently, the behavioural intentions of tourists. In addition, Kim et al. [78] demonstrated that the information quality on social media, encompassing added value, relevance, completeness, interestingness, and website design, serves as a significant predictor of destination image formation. Therefore, the following hypothesis is proposed:

H3: There is a statistically significant and positive relationship between digital content quality and perceived image.

The usefulness of digital content and its quality are key determinants of behavioral intentions [79]. In a study of a travel review website, Wang and Li [80] found that perceived usefulness of digital content was a significant predictor of travelers' eWOM and purchase decisions. Assuming that the official website of a destination management organization has a positive influence on the decision-making process of potential tourists, the research results of Chung et al. [35] found that the usefulness of a website positively influences satisfaction with the website itself. In addition, Carlson and O'Cass [63] research proves that when providing a high-quality content-oriented e-service, satisfaction is influenced by the quality of the e-service on a company's website through four key factors: usefulness, ease of use, entertainment, and complementary relationship. Armutcu et al. [79], who investigated the usefulness of digital content in social media, also found that the perception of a destination's online content is crucial for tourist satisfac-

tion. In addition, Ariffin et al. [81] found that perceived usefulness of digital video content is a significant predictor of overall satisfaction. Accordingly, the following hypothesis is proposed:

H4: There is a statistically significant and positive relationship between digital content usefulness and overall satisfaction.

In Bu et al. [1] study, digital information and digital entertainment content were positively related to social influence, which acted as a moderator between digital content marketing and electronic word of mouth (e-WOM). In a study by Majeed et al. [64], the influence of destination digital content on tourists' behavioural intentions and satisfaction was investigated as a moderator between these variables. The study confirmed that the perception of destination digital content significantly influences tourists' satisfaction. In addition, Negash et al. [39] have demonstrated a direct relationship between information quality and user satisfaction. The quality of information is determined by the informativeness and the entertainment value of the content. Based on the Uses and Gratifications Theory, Moon and An [82] discovered that the extent to which people find the use of digital media entertaining and enjoyable significantly influences tourist satisfaction. This leads to the following hypothesis:

H5: There is a statistically significant and positive relationship between digital content entertainment and overall satisfaction.

In their study, Chung et al. [35] showed that information quality is the most important predictor for confirming the quality of a destination website, which has a direct impact on destination website satisfaction. In addition, according to the study by Dedeoglu [65], the information quality of a content significantly affects the sharing of that content. Kullada and Kurniadjie [41] also proved that the quality of digital information is significantly related to the perception of the destination, which positively influences tourist satisfaction. Therefore, the following hypothesis is put forward:

H6: There is a statistically significant and positive relationship between digital content quality and overall satisfaction.

According to Wang's research [45] looking at the formation of taste consciousness through gastronomic blogs, perceived image has a significant and positive influence on intention to taste. Speaking of perceived image, when gastronomic blogs allow readers to form a clear and complete picture of a gastronomic place, they enhance the readers' intention to visit. Research by Mohammad Shafiee et al. [66] also confirms that the positive image of a destination created by social media has a positive effect on tourists' satisfaction and behavioural intentions. Tavitiyaman et al. [83] found that the perceived image of the destination is positively related to tourists' behavioral intention. In addition, these authors demonstrated that the more intensively tourists search for digital content, the stronger the relationship between perceived image and behavioral intentions. This leads to the following hypothesis:

H7: There is a statistically significant and positive relationship between perceived image and continued usage intention.

Researchers have reported a relationship between satisfaction with digital content and the intention to continue using it [35,81]. According to the findings of Chung et al. [35], the quality of the website is an important factor in website satisfaction. In addition, the research found that satisfaction with a website encourages potential tourists to use the website continuously. Ariffin et al. [81] argued that satisfaction is positively related to consumers' intention to continue watching digital video content. They conclude that the most respondents who are satisfied with watching digital video content on social networks intend to continue watching it. Accordingly, the following hypothesis is put forward:

H8: There is a statistically significant and positive relationship between overall satisfaction and continued usage intention.
H9: There is a statistically significant and positive relationship between digital content usefulness and continued usage intention.
H10: There is a statistically significant and positive relationship between digital content entertainment and continued usage intention.
H11: There is a statistically significant and positive relationship between digital content quality and continued usage intention.

To complement these hypotheses, we propose the conceptual model in Figure 1.

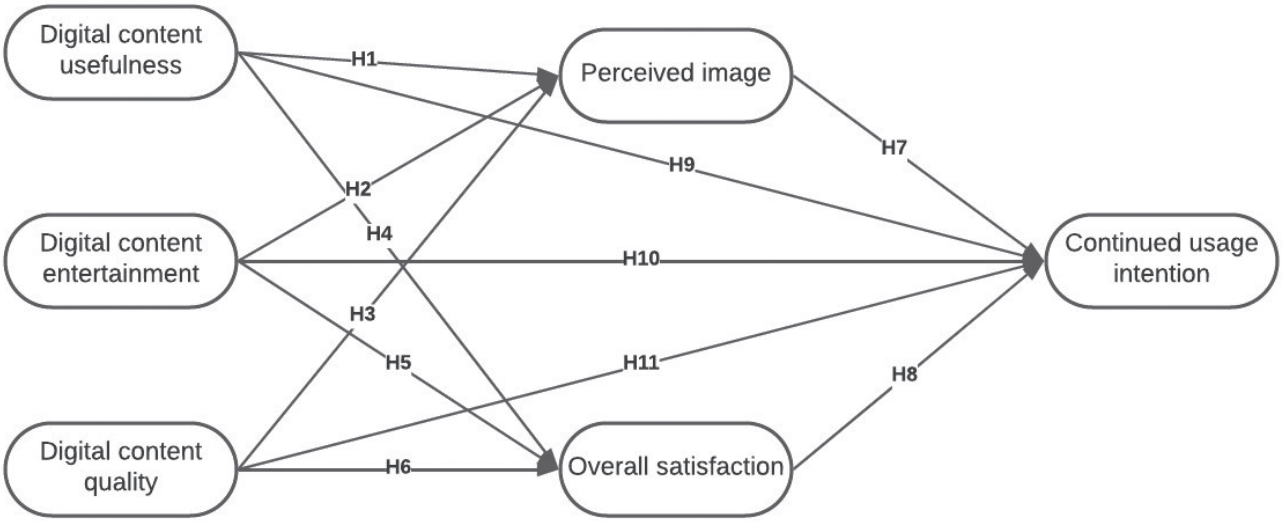


Figure 1 The conceptual model. Source: Authors.

4. METHODOLOGY

4.1. Participants and Sampling Procedure

Field research using the survey method was conducted in Istria, Croatia, from April to June 2022 to investigate how wine tourists perceive the impact of digital content on image, satisfaction, and continued usage intention. To answer the research questions, a QR code of the online structured questionnaire was created and distributed to different wineries in the Istria region. Likewise, the QR code linked to the questionnaire was distributed to the visitors of Vinistra, a wine event held for over 25 years, where Istrian and international winemakers exhibit, evaluate and promote their wines. Given the lack of a universally agreed upon definition of wine tourists, this study considers wine tourists "as people who visited a wine-producing region and/or participated in a wine festival" [17, p. 9] in the last 5 years. As in the study by Brown et al. [67], we considered a time span of 5 years to include respondents who visited this wine region in the period before and after the COVID-19 pandemic. Hall et al. [7] classified the motives of wine tourists as primary and secondary motives. Primary motives are directly related to the basic product (tasting or buying wine), while secondary or peripheral motives are integral to the overall wine experience (e.g., attending wine events or festivals, sightseeing and learning about wine, socializing, eating at wineries, rural excursions and entertainment). Therefore, respondents representing visitors to wine cellars and wine events are included in this research, and they were motivated by the aforementioned reasons.

4.2. Questionnaire

The questionnaire starts with general questions about their motivation to visit the destination and participate in and follow Istrian wine tourism, and then moves to measuring respondents' views on digital content usefulness, digital content entertainment, digital content quality, perceived image, overall satisfaction, and continued usage intention. A 5-point Likert scale was used to assess the level of agreement with the items, anchored at 1 = strongly disagree and 5 = strongly agree. The final section contained the sociodemographic data of the respondents.

Due to the novelty of the study and based on previous research in similar settings, the design of the measurement instrument was adapted to the needs of this study. Based on the relevant literature, the constructs of digital content usefulness, overall satisfaction, and continued usage intention were adapted according to Chung et al. [35]. The perception of entertainment offered by digital content was formulated based on the statements of Bu et al. [1], while the statements of Dedeoglu [65] were adopted to measure the digital content quality. The perceived image of digital content was tested based on five statements by Wang [45].

4.3. Modelling Framework

According to the Inverse square root method for estimating minimum sample size [69], assuming a common power level of 80% and significance level of 5%, the minimum sample size is 154,51. Exceeding this thresh-

old, a total of 312 correctly completed questionnaires were collected. Prior to analysis, all manifest variables were checked for outliers. Ensuring the validity and reliability of measurement scales prior to hypothesis testing, 71 outliers were identified and eliminated from further analysis, therefore 241 questionnaires were used for further analysis.

Outer model assessment, inner model assessment, and hypothesis testing were conducted with SmartPLS 3.0 using PLS-SEM, which is preferred for analyses focusing on prediction and theory development [71].

SEM has been continuously adopted by top-tier journals in marketing and consumer behavior [84], as it allows for the examination of complex relationships through comprehensive and simultaneous assessments of the relationships between constructs. SEM employs models to represent relationships between observed variables to quantify whether researchers' specified hypotheses are supported, enabling researchers to integrate and confront theory with data in a manner that advances understanding of complex relationships among constructs [85]. Fornell and Larcker [86] argue that SEM is a valuable method for theory building, well-suited to the ongoing development of knowledge equally effectively and efficiently. PLS was used instead of covariance-based SEM (CB-SEM) because it allows for simultaneous analysis of interrelationships among multiple latent variables or analysis of complex models with many manifest variables and theoretical constructs. Finally, PLS-SEM is more appropriate in situations where the analysis goal and emphasis are directed towards explaining variance or predicting constructs through model forecasting [87]. It is suitable when the aim is to develop theory, predict structural relationships (rather than strictly confirm them), and identify key drivers of the model.

Outer model assessment, inner model assessment, and hypothesis testing were conducted with SmartPLS 4.0 using PLS-SEM, which is preferred for analyses focusing on prediction and theory development [67].

5. RESEARCH RESULTS

A descriptive analysis was conducted to examine the study's sampling profile. Of the total number of respondents, 65.98% are female and 34.02% are male. The age distribution of most respondents is between 20 and 29 years old (39.83%), followed by the age group between 30 and 39 years old (29.05%), between 40 and 49 years old (18.67%), and 50 years and older (12.44%). Most respondents (34.44%) have a college degree, followed by those with a graduate degree (30.29%), a high school degree (28.63%), and a post-graduate degree (6.64%). The majority (28.63%) had a personal monthly income between 933 and 1325 EUR, followed by 26,56% with income between 663 and 932 EUR per month.

Fully 85.89% of the respondents have visited the wine region of Istria more than once in the last 5 years, while 14.11% of the respondents were first-time visitors. The largest number of respondents who participate in Istrian wine tourism is motivated by wine tasting (62.24%). This is followed by visiting wine events/festivals (32.43%), buying wine (29.71%) and visiting wine routes (27.42%). Respondents are least motivated to learn about the production process (11.24%). Most of the respondents, 65.15%, regularly follow digital content related to wine tourism in Istria, while 34.85% follow on an irregular basis.

5.1. Descriptive statistical analysis

Table 1 represents the mean values, standard deviations, coefficients Skewness and Kurtosis for each construct and variable. The calculated coefficients of Skewness and Kurtosis for the majority of the variables range from -1 to +1 and are considered acceptable in interpreting the normality of the distribution.

5.2. Measurement model results

Convergent validity, internal consistency and discriminant validity are assessed to evaluate the measurement model [71]. Table 1 shows the items used for each construct, their code names, external loadings, Cronbach's alpha, composite reliability (CR), and Average Variance Extracted (AVE). Two indicator variables were eliminated from further analysis, PIM1 and PIM2.

The results in Table 2 show an excellent level of internal consistency [72], as all Cronbach's alpha coefficient values are above 0.8 and range from 0.893 to 0.960. The values of CR are above the acceptable level of 0.7 [73], and range from 0.771 to 0.860. The results of the average variance extracted (AVE) exceed the threshold of 0.5 and range from 0.833 to 0.891, indicating that the constructs explain a high percentage of the variance in their indicators. Discriminant validity was assessed using the Heterotrait-Monotrait ratio, HTMT (Table 3).

The HTMT ratio is below the recommended threshold of 0.9, ranging from 0.779 to 0.892, indicating that the measurement model achieved discriminant validity [68].

Table 4 presents the results of the variance inflation factors (VIF), which indicates that all the values are below 5, so that no multicollinearity can be detected.

Table 1. Results of the descriptive statistical analysis.

Constructs/Variables	Code	Mean	Standard deviation	Skewness	Kurtosis
Digital content usefulness	**DCU**	**3.687**	**1.112**	**0.13475**	**-0.7965**
I can find a lot of interesting information on the digital content of wine tourism in Istria.	DCU1	3.959	1.155	0.824	-1.235
The information provided by the digital content of wine tourism in Istria is well balanced in terms of quality and amount.	DCU2	3.606	1.061	-0.032	-0.667
The information provided by the digital content of wine tourism in Istria is enriched with the additional links to related sites.	DCU3	3.427	1.080	-0.356	-0.418
The information provided by the digital content of wine tourism in Istria is very useful to me.	DCU4	3.755	1.153	0.103	-0.866
Digital content entertainment	**DCE**	**3.465**	**1.124**	**-0.405**	**-1.565**
The digital content about wine tourism in Istria is fun.	DCE1	3.440	1.118	-0.445	-0.502
The digital content about wine tourism in Istria is exciting.	DCE2	3.270	1.073	-0.540	-0.291
The digital content about wine tourism in Istria is attractive.	DCE3	3.685	1.181	-0.232	-0.767
Digital content quality	**DCQ**	**3.697**	**1.187**	**0.037**	**-0.869**
The information about wine tourism in Istria provided by digital content is complete.	DCQ1	3.373	1.035	-0.302	-0.482
The information about wine tourism in Istria provided by digital content is consistent	DCQ2	3.523	1.011	0.139	-0.657
The information about wine tourism in Istria provided by digital content is accurate	DCQ3	3.610	1.053	0.020	-0.646
Perceived image	**PIM**	**3.656**	**1.139**	**-0.094**	**-0.7544**
I think the digital content about wine tourism in Istria enables me to get to know what the wine region has to offer.	PIM1	3.747	1.169	0.234	-0.953
I think that the digital content about wine tourism in Istria enables me to understand the quality of services offered by the wine region.	PIM2	3.568	1.176	-0.281	-0.682
I think that the digital content about wine tourism in Istria enables me to get to know the wine environment offered by the wine region.	PIM3	3.647	1.176	-0.211	-0.766
I think that the digital content on wine tourism in Istria enables me to objectively evaluate the wine location.	PIM4	3.722	1.094	0.133	-0.827
I think that through digital content about wine tourism in Istria I can get objective assessments of this wine region.	PIM5	3.598	1.078	-0.345	-0.544
Overall satisfaction	**SAT**	**3.412**	**1.107**	**-0.394**	**-0.405**
After using the digital content of wine tourism in Istria I am very satisfied.	SAT1	3.610	1.065	-0.162	-0.580
After using the digital content of wine tourism in Istria I am very pleased.	SAT2	3.382	1.165	-0.614	-0.369
After using the digital content of wine tourism in Istria I am very delighted.	SAT3	3.245	1.090	-0.406	-0.267
Continued usage intention	**CUI**	**3.519**	**1.196**	**-0.393**	**-0.6115**
I will use the digital content of wine tourism in Istria on a regular basis in the future.	CUI1	3.365	1.173	-0.512	-0.432
I will frequently use the digital content of wine tourism in Istria in the future.	CUI2	3.448	1.191	-0.505	-0.492
I will continue to use the digital content of wine tourism in Istria.	CUI3	3.577	1.186	-0.315	-0.710
I will strongly recommend others to use the digital content of wine tourism in Istria.	CUI4	3.685	1.232	-0.243	-0.812

5.2. Structural model results

To evaluate the significance of the path coefficients, the bootstrapping procedure with 5000 subsamples was applied. The results of the hypotheses tests are shown in Table 5.

The results of the structural model show that the construct Digital content usefulness has a significant and positive effect on Perceived image (b=0.303; p<0.05). Hypothesis 4 has not been supported because Digital content usefulness has a non-significant effect on Overall satisfaction (b=0.109; p>0.05). Furthermore, Digital content entertainment significantly and positively affects Perceived image (b=0.274; p<0.05), Hypothesis 2, and Overall satisfaction (b=0.482; p<0.05), Hypothesis 5. Digital content quality has a significant and positive effect on Perceived image (b=0.367; p<0.05) and Overall satisfaction (b=0.324; p<0.05), hence H3 and H6 are supported. Both Perceived image (b=0.213; p<0.05) and Overall satisfaction (b=0.434; p<0.05) have a positive and significant effect on Continued usage intention, supporting the hypotheses H7 and H8. The direct

Table 2. Outer model evaluation.

Code constructs/ variables	Outer loadings	Cronbach's Alpha	CR (rho_a)	CR (rho_c)	AVE
Digital content usefulness (DCU)		0.901	0.931	0.931	0.771
DCU1	0.906				
DCU2	0.889				
DCU3	0.847				
DCU4	0.869				
Digital content entertainment (DCE)		0.901	0.901	0.938	0.834
DCE1	0.909				
DCE2	0.923				
DCE3	0.908				
Digital content quality (DCQ)		0.893	0.893	0.933	0.860
DCQ1	0.897				
DCQ2	0.923				
DCQ3	0.903				
Perceived image (PIM)		0.918	0.919	0.948	0.860
PIM2	0.922				
PIM3	0.946				
PIM4	0.913				
Overall satisfaction (SAT)		0.893	0.896	0.933	0.824
SAT1	0.901				
SAT2	0.918				
SAT3	0.904				
Continued usage intention (CUI)		0.941	0.942	0.958	0.850
CUI1	0.924				
CUI2	0.924				
CUI3	0.936				
CUI4	0.903				

Source: Research results.

Table 3. Heterotrait-Monotrait ratio.

	CUI	DCE	DCQ	DCU	PIM	SAT
CUI						
DCE	0.797					
DCQ	0.779	0.832				
DCU	0.809	0.793	0.866			
PIM	0.828	0.841	0.892	0.863		
SAT	0.875	0.892	0.854	0.779	0.853	

CUI=Continued usage intention; DCE= Digital content entertainment; DCQ= Digital content quality; DCU= Digital content usefulness; PIM=Perceived image; SAT=Overall satisfaction.
Source: Research results.

Table 4. Variance inflation factor.

	CUI	DCE	DCQ	PIM	SAT
CUI					
DCE	3.457			2.531	2.531
DCQ	3.834			3.100	3.100
DCU	3.175			2.809	
PIM	4.126				2.809
SAT	3.655				

CUI=Continued usage intention; DCE= Digital content entertainment; DCQ= Digital content quality; DCU= Digital content usefulness; PIM=Perceived image; SAT=Overall satisfaction.
Source: Research results.

effect of Digital content usefulness has a significant and positive effect on continued usage intention (b=0.254; p<0.05), while Digital content entertainment has a non-significant effect on continued usage intention (b=0.076; p>0.05) as well as Digital content quality on continued usage intention (b=-0.045; p>0.05).

Using PLS predict, the Q^2 value compares the prediction errors of the PLS path model against simple mean predictions. The Q^2 value for Perceived image is 0.740, Continued usage intention 0.644, while for Overall satisfaction 0.704. The Q^2 values are positive, so the prediction error of the PLS-SEM results is smaller than the prediction error of simply using the mean values. Therefore, the PLS-SEM models offers better predictive performance [88].

6. DISCUSSION AND CONCLUSIONS

The empirical research conducted represents a contribution to the knowledge of digital content marketing development and, therefore, this study has a scientific contribution reflected in its theoretical and practical dimensions. From a theoretical point of view, this paper represents a contribution in the field of digital marketing, especially from the aspect of wine tourism settings. The practical contribution of this paper can be seen in the possibility of applying the knowledge derived from the research in the development of digital marketing strategies, especially content strategies.

This study examined the influence of DC dimensions on perceived image and overall satisfaction of wine tourists. It also examined how wine tourists' perceived image and satisfaction influence their behavioural intentions. Our results show that DC usefulness, DC entertainment and DC quality have a positive influence on perceived image. These results are consistent with the research findings of Kullada and Kurniadjie [41], who demonstrated that the usefulness and quality of digital

Table 5. Structural model assessment.

	Relationship	*b*	SD	T statistics	Confidence interval	p-value	Decision
H1	Digital content usefulness? Perceived image	0.303	0.053	5.683	0.201-0.409	0.000	Supported
H2	Digital content entertainment? Perceived image	0.274	0.052	5.294	0.171-0.375	0.000	Supported
H3	Digital content quality? Perceived image	0.367	0.063	5.857	0.238-0.484	0.000	Supported
H4	Digital content usefulness? Overall satisfaction	0.109	0.064	1.693	-0.009-0.240	0.090	Not supported
H5	Digital content entertainment? Overall satisfaction	0.482	0.061	7.837	0.357-0.599	0.000	Supported
H6	Digital content quality? Overall satisfaction	0.324	0.077	4.213	0.167-0.468	0.000	Supported
H7	Perceived image? Continued usage intention	0.213	0.086	2.486	0.036-0.369	0.013	Supported
H8	Overall satisfaction? Continued usage intention	0.434	0.079	5.480	0.268-0.577	0.000	Supported
H9	Digital content usefulness? continued usage intention	0.254	0.057	4.440	0.144-0.370	0.000	Supported
H10	Digital content entertainment? continued usage intention	0.076	0.083	0.919	0.357-0.599	0.358	Not supported
H11	Digital content quality? continued usage intention	-0.045	0.069	0.647	-0.178-0.091	0.517	Not supported

Source: Research results.

content is a significant predictor of destination image formation. In addition, the research findings revealed that DC entertainment and DC quality have a significant impact on overall satisfaction. The research findings of Carlson and O'Cass [63] demonstrate that when providing a high-quality content-driven e-service, satisfaction is influenced by the quality of the e-service on the company's website through one of the key factors – entertainment, ease of use, complimentary relationship and usefulness of the content. In addition, Chung et al. [35] confirmed in their research that the quality of information has a positive effect on satisfaction with the destination website itself. In terms of wine tourists' behavioural intentions, this study confirmed that perceived image and overall satisfaction have a positive influence on continued usage intention. According to the research findings of Wang [45], perceived image had a significant and positive influence on tourists' behavioural intentions. In addition, the research of Mohammad Shafiee et al. [66] confirmed that a positive image of a destination generated by social media positively influences satisfaction and eWOM intentions. Through research by Chung et al. [35], it was found that satisfaction with a website encourages potential tourists to continue using the website. The significant relationship between digital content usefulness and continued usage intention is noteworthy for several reasons. Firstly, it suggests that users perceive digital content as a valuable resource that influences their intention to continue using a particular platform or service, which underscores the importance of digital content in shaping user behaviour and engagement.

Based on the research conducted, recommendations can be made for marketers involved in providing and creating digital content related to wine tourism. Indeed, customers today voluntarily search for interesting content or take the initiative to look for information about products and services through various digital media. Therefore, marketing managers in wine tourism must understand the characteristics of marketing content such as dialogue and communication, storytelling, and encouraging interaction with tourists. As Santos et al. [76] emphasized, one of the most important digital tools in the wine tourism is narrative, i.e., storytelling about wine, which can enhance the wine tourism experience, and boost the reputation and, consequently, the image of a destination. Digital content must contain the most effective and up-to-date information to meet tourists' information needs. When creating content, marketers should also consider the entertainment aspects of the content. Therefore, this study suggests that wine tourism service providers should work with marketing managers to create and improve the utility aspect of wine tourism content for their target segments. Marketers can expect that high-quality information combined with a usefulness and entertainment factor will increase satisfaction with digital content. In addition, high-quality digital content allows tourists to get an idea of the wine region and wine products, which increases the perceived image when viewing such content. In any case, it should be mentioned that it is necessary to stimulate tourists (through various contests, gamification, VR, AR, etc.) and maintain their interest so that they continuously follow the digital content through social networks, various blogs, websites and the like. Consequently, by designing such content, tourists can be expected to be more engaged in terms of continuously using and sharing the content.

In the empirical investigation conducted, some limitations were identified. The first limitation refers to the sample of the conducted research. The respondents are

exclusively people from the Republic of Croatia, so the responses of foreign visitors to Istria were not taken into account. The reason for this is that the questionnaire itself was distributed exclusively in Croatian. In addition, the majority of respondents in the study are female. The views of men about digital content on wine tourism in Istria have not been sufficiently explored, and it is likely that their views could significantly change the conclusions of the study. Therefore, it is recommended that the survey questionnaire covers respondents in a wider geographical area and not only in the territory of Croatia. It is also recommended that the questionnaire be distributed in such a way that both genders are covered equally. Comparing difference among sociodemographic groups or groups with different levels of wine involvement could enhance the depth of this analysis and broaden the implications of our findings. In addition to the above, only the quantitative method was used in this study; so, for future research it is recommended to use other methods, especially qualitative ones (e.g., focus groups, in-depth interviews).

ACKNOWLEDGEMENTS

This paper is based on the research conducted by Nikolina Ritossa as her master thesis "Uloga digitalnih marketinških aktivnosti u razvoju vinskog turizma Istre", mentored by Marina Perišić Prodan, PhD, and defended at University of Rijeka, Faculty of Tourism and Hospitality Management in July 2022.

REFERENCES

[1] Bu, Y., Parkinson, J., Thaichon, P. (2021). Digital content marketing as a catalyst for e-WOM in food tourism. Australasian Marketing Journal, 29(2), 142-154. https://doi.org/10.1016/j.ausmj.2020.01.001

[2] Del Chiappa, G., Martín, J. C., Román, C. (2022). Developing wine tourism experiences. A discrete choice analysis using best-worst scaling data. Wine Economics and Policy, 11(1), 107-126. https://doi.org/10.36253/wep-9946

[3] Hall, C. M., Johnson, G., Camboume, C., Macionis, N., Mitchell, R., Sharples, L. (2000). Wine tourism: an introduction, in: Hall, C.M., Sharples, L., Cambourne, B., Macionis, N. (Eds.), Wine tourism around the world development management and markets, Elsevier Butterworth-Heinemann, Oxford, 1-24

[4] García-Rodea, L. F., Thomé-Ortiz, H., Espinoza-Ortega, A., de Alcântara Bittencourt-César, P. (2022). Viniculture and Tourism in the New World of Wine: a literature review from the American continent. Wine Economics and Policy, 11(1), 127-140. https://doi.org/10.36253/wep-10897

[5] World Tourism Organization and Basque Culinary Center (2019), Guidelines for the Development of Gastronomy Tourism, UNWTO, Madrid, (accessed 15 July 2023) DOI: https://doi.org/10.18111/9789284420957

[6] Brochado, A., Stoleriu, O., and Lupu, C. (2021). Wine tourism: a multisensory experience. Current Issues in Tourism, 24(5), 597-615. https://doi.org/10.1080/13683500.2019.1649373

[7] Haller, C., Hess-Misslin, I., and Mereaux, J. P. (2021). Aesthetics and conviviality as key factors in a successful wine tourism experience. International Journal of Wine Business Research, 33(2), 176-196. https://doi.org/10.1108/IJWBR-12-2019-0063

[8] Gómez-Carmona, D., Paramio, A., Cruces-Montes, S., Marín-Dueñas, P. P., Montero, A. A., & Romero-Moreno, A. (2023). The effect of the wine tourism experience. Journal of Destination Marketing & Management, 29, 100793. https://doi.org/10.1016/j.jdmm.2023.100793

[9] Santos, V. R., Ramos, P., Almeida, N., & Santos-Pavón, E. (2019). Wine and wine tourism experience: A theoretical and conceptual review. Worldwide Hospitality and Tourism Themes, 11(6), 718-730. https://doi.org/10.1108/WHATT-09-2019-0053

[10] Čop, T., Juračak, J., Njavro, M. (2019). Production and business results of wine producers in continental and Adriatic Croatia. Proceedings in Food System Dynamics, 93-101. DOI: http://dx.doi.org/10.18461/pfsd.2019.1910

[11] Statista, 2023. Wine – Croatia. https://www.statista.com/outlook/cmo/alcoholic-drinks/wine/croatia (accessed 16 October 2023)

[12] Tomljenović, R., Getz, D. (2009). Life-cycle stages in wine tourism development: a comparison of wine regions in Croatia. Tourism Review International, 13(1), 31-49. https://doi.org/10.3727/154427209789130666

[13] Official Gazette: Tourism development strategy of the republic of croatia until 2020, NN 55/2013, https://narodne-novine.nn.hr/clanci/sluzbeni/2013_05_55_1119.html, (accessed 12 September 2023)

[14] Hanžek, M., Sušić, G. (2019). Croatian wine tourism from the winery perspective: the case of the Grand Cro. 4th International Thematic Mono-

graph: Modern Management Tools and Economy of Tourism Sector in Present Era. Belgrade, 669-84. https://doi.org/10.31410/tmt.2019.669

[15] Katunar, J., Mrak, M. K., Sokolić, D. (2020). The impact of distribution channels on the bargaining position of Croatian wine producers. Ekonomski vjesnik/Econviews-Review of Contemporary Business, Entrepreneurship and Economic Issues, 33(2), 545-558.

[16] Gómez, M., Pratt, M. A., Molina, A. (2019). Wine tourism research: A systematic review of 20 vintages from 1995 to 2014. Current Issues in Tourism, 22(18), 2211-2249. https://doi.org/10.1080/13683500.2018.1441267

[17] Gastaldello, G., Giampietri, E., Zaghini, E., Rossetto, L. (2022). Virtual wine experiences: is covid extending the boundaries of wine tourism?. Wine Economics and Policy, 11(2), 5-18. https://doi.org/10.36253/wep-12177

[18] Statista, 2023. Share of organizations with a content marketing strategy in place worldwide from 2019 to 2022. https://www.statista.com/statistics/251437/companies-with-defined-content-marketing-strategies-worldwide/ (accessed 07 September 2023)

[19] Piven, I.: Digital Content Marketing, in: A, Hanlon, T. L. Tuten (Eds.), The SAGE Handbook of Digital Marketing, SAGE Publications Ltd., London, 2022, pp. 310-329. https://doi.org/10.4135/9781529782509.n18

[20] Wang, R., Chan-Olmsted, S. (2020). Content marketing strategy of branded YouTube channels. Journal of Media Business Studies, 17(3-4), 294-316. https://doi.org/10.1080/16522354.2020.1783130

[21] Du Plessis, C. (2017). The role of content marketing in social media content communities. South African Journal of Information Management, 19(1), 1-7. https://doi.org/10.4102/sajim.v19i1.866

[22] Hollebeek, L. D., Macky, K. (2019). Digital content marketing's role in fostering consumer engagement, trust, and value: Framework, fundamental propositions, and implications. Journal of interactive marketing, 45(1), 27-41. https://doi.org/10.1016/j.intmar.2018.07.003

[23] Jia, W., Kim, S. (2010). The mediating effect of experiential value on customers' perceived value of digital content: China's anti-virus program market. Journal of Global Academy of Marketing Science, 20(2), 219-230. https://doi.org/10.1080/12297119.2010.9730194

[24] Lou, C., Xie, Q. (2021). Something social, something entertaining? How digital content marketing augments consumer experience and brand loyalty. International Journal of Advertising, 40(3), 376-402. https://doi.org/10.1080/02650487.2020.1788311

[25] Lou, C., Xie, Q., Feng, Y., Kim, W. (2019). Does non-hard-sell content really work? Leveraging the value of branded content marketing in brand building. Journal of Product & Brand Management, 28(7), 773-786. https://doi.org/10.1108/JPBM-07-2018-1948

[26] Bowden, J., Mirzaei, A. (2021). Consumer engagement within retail communication channels: an examination of online brand communities and digital content marketing initiatives. European Journal of Marketing, 55(5), 1411-1439. https://doi.org/10.1108/EJM-01-2018-0007

[27] Wang, P., McCarthy, B. (2020). What do people "like" on Facebook? Content marketing strategies used by retail bank brands in Australia and Singapore. Australasian Marketing Journal, 29(2), 155-176. https://doi.org/10.1016/j.ausmj.2020.04.008

[28] Wang, W. L., Malthouse, E. C., Calder, B., Uzunoglu, E. (2019). B2B content marketing for professional services: In-person versus digital contacts. Industrial marketing management, 81, 160-168. https://doi.org/10.1016/j.indmarman.2017.11.006

[29] Mathew, V., Soliman, M. (2021). Does digital content marketing affect tourism consumer behavior? An extension of technology acceptance model. Journal of Consumer Behaviour, 20(1), 61-75. https://doi.org/10.1002/cb.1854

[30] Content Marketing Institute (2023). Content marketing definition. https://contentmarketinginstitute.com/what-is-content-marketing/ (accessed 10 March 2023)

[31] Hollebeek, L. D., Macky, K. (2019). Digital content marketing's role in fostering consumer engagement, trust, and value: Framework, fundamental propositions, and implications. Journal of interactive marketing, 45(1), 27-41. https://doi.org/10.1016/j.intmar.2018.07.003

[32] Dahiya, R., Gayatri. (2018). A research paper on digital marketing communication and consumer buying decision process: An empirical study in the Indian passenger car market. Journal of Global Marketing, 31(2), 73-95. https://doi.org/10.1080/08911762.2017.1365991

[33] Du Plessis, C. (2017). The role of content marketing in social media content communities. South African Journal of Information Management, 19(1), 1-7. https://doi.org/10.4102/sajim.v19i1.866

[34] Jia, W., Kim, S. (2010). The mediating effect of experiential value on customers' perceived value of

digital content: China's anti-virus program market. Journal of Global Academy of Marketing Science, 20(2), 219-230. https://doi.org/10.1080/12297119.2010.9730194

[35] Chung, N., Lee, H., Lee, S. J., Koo, C. (2015). The influence of tourism website on tourists' behavior to determine destination selection: A case study of creative economy in Korea. Technological Forecasting and Social Change, 96, 130-143. https://doi.org/10.1016/j.techfore.2015.03.004

[36] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340. https://doi.org/10.2307/249008

[37] Joo, Y. G., Sohn, S. Y. (2008). Structural equation model for effective CRM of digital content industry. Expert systems with Applications, 34(1), 63-71. https://doi.org/10.1016/j.eswa.2006.08.016

[38] Tavitiyaman, P., Zhang, X., Tsang, W. Y. (2022). How tourists perceive the usefulness of technology adoption in hotels: Interaction effect of past experience and education level. Journal of China Tourism Research, 18(1), 64-87. https://doi.org/10.1080/19388160.2020.1801546

[39] Negash, S., Ryan, T., Igbaria, M. (2003). Quality and effectiveness in web-based customer support systems. Information & management, 40(8), 757-768. https://doi.org/10.1016/S0378-7206(02)00101-5

[40] Hur, K., Kim, T. T., Karatepe, O. M., Lee, G. (2017). An exploration of the factors influencing social media continuance usage and information sharing intentions among Korean travellers. Tourism management, 63, 170-178. https://doi.org/10.1016/j.tourman.2017.06.013

[41] Kullada, P., Michelle Kurniadjie, C. R. (2020). Examining the influence of digital information quality on tourists' experience. Journal of Quality Assurance in Hospitality & Tourism, 22(2), 191-217. https://doi.org/10.1080/1528008X.2020.1769522

[42] Zhang, K. Z., Benyoucef, M., Zhao, S. J. (2016). Building brand loyalty in social commerce: The case of brand microblogs. Electronic Commerce Research and Applications, 15, 14-25. https://doi.org/10.1016/j.elerap.2015.12.001

[43] Setia, P., Setia, P., Venkatesh, V., Joglekar, S. (2013). Leveraging digital technologies: How information quality leads to localized capabilities and customer service performance. MIS quarterly, 565-590. https://doi.org/10.25300/MISQ/2013/37.2.11

[44] Qian, J., Law, R., Wei, J., Shen, H., Sun, Y. (2020). Hotels' self-positioned image versus customers' perceived image: a case study of a boutique luxury hotel in Hong Kong. Tourism Review, 79(1), 198-211. https://doi.org/10.1108/TR-02-2019-0078

[45] Wang, H. Y. (2011). Exploring the factors of gastronomy blogs influencing readers' intention to taste. International Journal of Hospitality Management, 30(3), 503-514. https://doi.org/10.1016/j.ijhm.2010.07.009

[46] Tsai, C. T. (2016). Memorable tourist experiences and place attachment when consuming local food. International Journal of Tourism Research, 18(6), 536–548. https://doi.org/10.1002/jtr.2070

[47] Blazquez-Resino, J. J., Muro-Rodriguez, A. I., Perez-Jimenez, I. R. (2016). Differences of perceived image generated through the web site: empirical evidence obtained in spanish destinations. Frontiers in psychology, 7, 1-14. https://doi.org/10.3389/fpsyg.2016.01861

[48] Llodra-Riera, I., Martínez-Ruiz, M. P., Jiménez-Zarco, A. I., Izquierdo-Yusta, A. (2015). A m ultidimensional analysis of the information sources construct and its relevance for destination image formation. Tourism Management, 48, 319–328. https://doi.org/10.1016/j.tourman.2014.11.012

[49] Jefferson, S., Tanton, S. (2015). Valuable content marketing: how to make quality content your key to success. Kogan page publishers, London; Philadelphia.

[50] Zhang, H., Wu, Y., Buhalis, D. (2018). A model of perceived image, memorable tourism experiences and revisit intention. Journal of destination marketing & management, 8, 326-336. https://doi.org/10.1016/j.jdmm.2017.06.004

[51] Doolin, B., Burgess, L., Cooper, J. (2002). Evaluating the use of the Web for tourism marketing: a case study from New Zealand. Tourism management, 23(5), 557-561. https://doi.org/10.1016/S0261-5177(02)00014-6

[52] Ku, E. C., Chen, C. D. (2015). Cultivating travellers' revisit intention to e-tourism service: the moderating effect of website interactivity. Behaviour & Information Technology, 34(5), 465-478. https://doi.org/10.1080/0144929X.2014.978376

[53] Hansemark, O. C., Albinsson, M. (2004). Customer satisfaction and retention: the experiences of individual employees. Managing Service Quality: An International Journal, 14(1), 40-57. https://doi.org/10.1108/09604520410513668

[54] Thaichon, P., Quach, T. N. (2015). The relationship between service quality, satisfaction, trust, value, commitment and loyalty of Internet service providers' customers. Journal of Global Scholars of Mar-

keting Science, 25(4), 295-313. https://doi.org/10.1080/21639159.2015.1073419

[55] Dahiya, R., Gayatri. (2018). A research paper on digital marketing communication and consumer buying decision process: An empirical study in the Indian passenger car market. Journal of Global Marketing, 31(2), 73-95. https://doi.org/10.1080/08911762.2017.1365991

[56] Soltani-Nejad, N., Taheri-Azad, F., Zarei-Maram, N., Saberi, M. K. (2020). Developing a model to identify the antecedents and consequences of user satisfaction with digital libraries. Aslib Journal of Information Management, 72(6), 979-997. https://doi.org/10.1108/AJIM-04-2020-0099

[57] Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of marketing research, 17(4), 460-469. https://doi.org/10.1177/002224378001700405

[58] Li, Y., Shang, H. (2020). Service quality, perceived value, and citizens' continuous-use intention regarding e-government: Empirical evidence from China. Information & Management, 57(3), 103197. https://doi.org/10.1016/j.im.2019.103197

[59] Pang, S., Bao, P., Hao, W., Kim, J., Gu, W. (2020). Knowledge sharing platforms: An empirical study of the factors affecting continued use intention. Sustainability, 12(6), 2341. https://doi.org/10.3390/su12062341

[60] Van der Heijden, H. (2004). User acceptance of hedonic information systems. MIS quarterly, 695-704. https://doi.org/10.2307/25148660

[61] Eigenraam, A. W., Eelen, J., Verlegh, P. W. (2021). Let me entertain you? The importance of authenticity in online customer engagement. Journal of interactive marketing, 54, 53-68. https://doi.org/10.1016/j.intmar.2020.11.001

[62] Jorge, F., Teixeira, M. S., Gonçalves, R., The influence of digital marketing tools perceived usefulness in a rural region destination image, in: Rocha, Á., Adeli, H., Reis, L. P., Costanzo, S., Orovic, I., & Moreira, F. (Eds.), Trends and Innovations in Information Systems and Technologies: Volume 3, Springer Nature, Switzerland, 2020, pp. 557-569. https://doi.org/10.1007/978-3-030-45697-9_54

[63] Carlson, J., O'Cass, A. (2010). Exploring the relationships between e-service quality, satisfaction, attitudes and behaviours in content-driven e-service web sites. Journal of services marketing, 24(2), 112-127. https://doi.org/10.1108/08876041011031091

[64] Majeed, S., Zhou, Z., Lu, C., Ramkissoon, H. (2020). Online tourism information and tourist behavior: a structural equation modeling analysis based on a self-administered survey. Frontiers in Psychology, 11, 599. https://doi.org/10.3389/fpsyg.2020.00599

[65] Dedeoglu, B. B. (2019). Are information quality and source credibility really important for shared content on social media? The moderating role of gender. International Journal of Contemporary Hospitality Management, 31(1), 513-534. https://doi.org/10.1108/IJCHM-10-2017-0691

[66] Mohammad Shafiee, M.; Reihaneh Alsadat, T.; Tavakoli, H. (2016) The effect of destination image on tourist satisfaction, intention to revisit and WOM: An empirical research in Foursquare social media. In Proceedings of the 10th International Conference on E-Commerce in Developing Countries: With Focus on e-Tourism (ECDC), Isfahan, Iran, 15–16 April 2016; https://doi.org/10.1109/ECDC.2016.7492964

[67] Brown, G. P., Havitz, M. E., Getz, D. (2007). Relationship between wine involvement and wine-related travel. Journal of Travel & Tourism Marketing, 21(1), 31-46. https://doi.org/10.1300/J073v21n01_03

[68] Hair, J. F., Ringle, C. M., Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139-152. https://doi.org/10.2753/MTP1069-6679190202

[69] Kock, N., Hadaya, P. (2016). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information systems journal, 28(1), 227-261. https://doi.org/10.1111/isj.12131

[70] Reinartz, W., Haenlein, M., Henseler, J. (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. International Journal of research in Marketing, 26(4), 332-344. https://doi.org/10.1016/j.ijresmar.2009.08.001

[71] Henseler, J., Hubona, G., Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. Industrial management & data systems, 116 (1), 2-20. https://doi.org/10.1108/IMDS-09-2015-0382

[72] Hair Jr, J. F., Sarstedt, M., Ringle, C. M., Gudergan, S. P. (2017). Advanced issues in partial least squares structural equation modeling. Sage publications.

[73] Sarstedt, M., & Cheah, J. H. (2019). Partial least squares structural equation modeling using SmartPLS: a software review, Journal of Marketing Analytics, 7, 196-202. https://doi.org/10.1057/s41270-019-00058-3

[74] Santos, V., Dias, A., Ramos, P., Madeira, A., Sousa, B. (2022). The Influence of wine storytelling on the

global wine tourism experience. Wine Economics and Policy, 11(1), 3-13. https://doi.org/10.36253/wep-11454

[75] Zhang, K., Chen, Y., & Li, C. (2019). Discovering the tourists' behaviors and perceptions in a tourism destination by analyzing photos' visual content with a computer deep learning model: The case of Beijing. Tourism Management, 75, 595-608. https://doi.org/10.1016/j.tourman.2019.07.002

[76] Baber, R., & Baber, P. (2023). Influence of social media marketing efforts, e-reputation and destination image on intention to visit among tourists: application of SOR model. Journal of Hospitality and Tourism Insights, 6(5), 2298-2316. https://doi.org/10.1108/JHTI-06-2022-0270

[77] Tang, L. R., Jang, S. S., & Morrison, A. (2012). Dual-route communication of destination websites. Tourism management, 33(1), 38-49. https://doi.org/10.1016/j.tourman.2011.01.021

[78] Kim, S. E., Lee, K. Y., Shin, S. I., & Yang, S. B. (2017). Effects of tourism information quality in social media on destination image formation: The case of Sina Weibo. Information & management, 54(6), 687-702. https://doi.org/10.1016/j.im.2017.02.009

[79] Armutcu, B., Tan, A., Amponsah, M., Parida, S., & Ramkissoon, H. (2023). Tourist behaviour: The role of digital marketing and social media. Acta psychologica, 240, 104025. https://doi.org/10.1016/j.actpsy.2023.104025

[80] Wang, P., & Li, H. (2019). Understanding the antecedents and consequences of the perceived usefulness of travel review websites. International Journal of Contemporary Hospitality Management, 31(3), 1086-1103. https://doi.org/10.1108/IJCHM-06-2017-0380

[81] Ariffin, S. K., Hilmawan, H., & Zhang, Q. (2023). Consumers Consumption Values and Consumer Satisfaction toward Continuous Intention to View Digital Video Content. Journal of Entrepreneurship, Business and Economics, 11(2), 81-129.

[82] Moon, J. W., & An, Y. (2022). Uses and gratifications motivations and their effects on attitude and e-tourist satisfaction: a multilevel approach. Tourism and Hospitality, 3(1), 116-136. https://doi.org/10.3390/tourhosp3010009

[83] Tavitiyaman, P., Qu, H., Tsang, W. S. L., & Lam, C. W. R. (2021). The influence of smart tourism applications on perceived destination image and behavioral intention: The moderating role of information search behavior. Journal of Hospitality and Tourism Management, 46, 476-487. https://doi.org/10.1016/j.jhtm.2021.02.003

[84] Ashman, R., & Patterson, A. (2015) Seeing the big picture in services marketing research: infographics, SEM and data visualisation. Journal of Services Marketing, 29(6/7), 613-621. https://doi.org/10.1108/JSM-01-2015-0024

[85] Schumacker, R., & Lomax, R. G. (2010). Structural equation modeling. NY. Routlege.

[86] Fornell, C., Larcker, D. F. (1981) Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 39-50. https://doi.org/10.1177/002224378101800104

[87] Hair, J. F., Ringle, C. M., Sarstedt, M. (2011) PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139-152. https://doi.org/10.2753/MTP1069-6679190202

[88] Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive Model Assessment in PLS-SEM: Guidelines for Using PLSpredict. European Journal of Marketing, 53(11), 2322-2347. https://doi.org/10.1108/EJM-02-2019-0189

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: d'Ament, G., Nayeem, T., & Saliba, A.J. (2024). Personality, mood, or emotion? Influence of customer trait and state during the cellar door experience on sales and word-of-mouth intention: A Bayesian approach. *Wine Economics and Policy* 13(1): 49-62. doi: 10.36253/wep-14395

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

ORCID
GdA: 0000-0003-2009-4158
TN: 0000-0003-1818-8024
AJS: 0000-0002-4823-4602

Personality, mood, or emotion? Influence of customer trait and state during the cellar door experience on sales and word-of-mouth intention: A Bayesian approach

Genevieve d'Ament[1,*], Tahmid Nayeem[2], Anthony J. Saliba[1]

[1] *Charles Sturt University, School of Psychology, Faculty of Business, Justice, and Behavioural Sciences, Wagga Wagga, NSW Australia*
[2] *Charles Sturt University, School of Business, Faculty of Business, Justice, and Behavioural Sciences, Albury, NSW Australia*
Email: genevieved.ament@gmail.com; tnayeem@csu.edu.au; asaliba@csu.edu.au
*Corresponding author.

Abstract. Direct-to-customer sales provide higher returns, maximising the profitability of wine businesses. While recent research has expanded the understanding of the sales relationship developed during a cellar door experience, individual influences on this relationship remain under-researched. The current study examines the direct-to-customer sales relationship co-created with staff during a cellar door experience. The influence of a participant's personality, mood, and emotion on onsite sales and intention to recommend the experience was captured through an online questionnaire completed by 136 customers during their cellar door experience. A Bayesian Network was produced to determine the influence of states and traits on purchase and loyalty behaviours. Results showed all outcome variables were sensitive to wine-evoked emotions, aroused mood, and neuroticism. Additionally, results show that cellar door staff make an invaluable contribution to maximising profitability. The developed framework provides cellar door managers and staff with a valuable guide to create engaging cellar door experiences which are essential to maximising overall winery profitability.

Keywords: cellar door experience, personality, mood, emotion, word-of-mouth, consumer behaviour, Bayesian, trait and state.

1. INTRODUCTION

Wine industry research is vast and multidisciplinary. Research relevant to the cellar door experience (CDE) aligns with four main disciplines: tourism, economics, marketing, and consumer neuroscience [1-3], each reporting the importance of customer service however, few examine the co-created experience *during* the experience, relying instead on post-experience surveys and interviews. This study was designed to capture participant interactions with staff while actively co-creating the experience. Results will provide

insights for developing a CDE framework to assist management and staff in developing enjoyable CDEs that maximise wine business profitability.

The impact of lockdowns on direct-to-customer (DtC) sales at cellar doors during COVID-19 highlighted the value of the CDE to a winery's profitability. CEO of the Margaret River Wine Association Amanda Whiteland [4] stated "*…the loss of the cellar door DtC sales and operations for the 10 weeks was substantial. It not only affected their cash flow but also affected their staff, their stock turnover, exposure, wine club sign-ups and overall experience*." Wine businesses relying upon cellar door sales struggled to remain viable during the pandemic, as their operations were decimated during travel restrictions. However, sales increased by up to 270% for cellar doors with viable online sales avenues (i.e., an established wine club database), and once travel restrictions eased in some regions [5,6].

Pre-pandemic research on DtC sales via the cellar door, online, and through wine club memberships reports Australian wineries sell 40-90% via DtC, the most significant contribution being onsite cellar door sales with wine club memberships and post-visit sales due to CDEs increasing these contributions [7]. These figures support the importance of CDEs, but as Ball and Stolle [8] ask, what constitutes an excellent CDE? The efficacy of DtC sales and increasing cellar door foot traffic is recognised. However, on-site restaurants and cafes tend to reduce profitability and picturesque locations perfect for Instagram may result in busloads of tourists taking photos rather than buying wine [9]. Tourism research has prompted wineries to develop activities to entice less wine-involved tourists; however, such an approach risks losing sight of why wineries make wine. Most wineries make wine to sell for consumption, and tourist entertainment may be a by-product but not *the* product.

Despite early wine tourism research declaring "*any form of segmentation of wine tourists other than the broadest has little meaning, beyond assisting wine-tourism operators in a specific region*" [10] visitors to cellar doors continued to be segmented with recommendations for targeted preferences [11] and the needs of Millennials [12]. Yet unless visitors to cellar doors arrive with a case file or advise staff upon arrival that they are wine-involved or uninvolved, the research is of little use to cellar door staff [13]. The need for a positive CDE has been established, regardless of the market segment into which the customer falls [14].

Consistently delivering enjoyable CDEs is important for creating not only sales but also generating positive word-of-mouth (WOM) marketing [15]. Consumers have been shown to trust WOM as it is created independently of the winery [16] and influences consumer behaviour concerning brand image and attitude [17]. Research from the McLaren Vale wine region supports WOM as an essential marketing tool for convincing people to visit wineries and wine regions, created by each visitor at every point of contact with the winery, its wine, and its staff. However, while positive WOM encourages visitation, negative WOM has a more significant influence, warning people to stay away [18]. Negative WOM resulting from poor CDEs risks reducing cellar door foot traffic and weakening brand image, reinforcing the need to understand the sales relationship developed between staff and customers during the CDE.

Exploration of psychological phenomena in cellar door research has been scarce, with researchers voicing frustration at the lack of depth [19] and the adoption of predominantly behavioural paradigms in the experience literature [20]. Therefore, understanding the importance of the interactions of individual traits (e.g., personality), and states (e.g., mood and emotion) during CDEs is essential.

2. STUDY BACKGROUND

2.1. Personality

Personality is a reliable predictor of future behaviour as it moderates attention and processing of our environment and affective states (i.e., mood and emotion), influenced by current experience, against schemas developed from past experiences. Personality types have different needs [21]. For example, extroverts seek stimulating environments, whereas introverts seek calmer, quieter environments with fewer stimuli. Therefore, understanding the personality of cellar door visitors should improve the ability to meet their expectations. Bruwer and Alant [22] found wine tourists exhibit a range of personality traits, with consumer behaviour influenced by an infinite mix of extrinsic (i.e., region, CDE) and intrinsic (i.e., state, trait) motivators. Thus, understanding the personality of cellar door visitors should improve the ability to meet their expectations.

Various personality theories and associated inventories have been developed for multidisciplinary use. Eysenck proposed three factors extroversion-introversion, neuroticism-stability, and psychoticism-superego [23]. Jung theorised that when evolving toward selfhood, individuals adopt different ways of relating to experience, resulting in a kaleidoscope of personality facets. Costa and McCrae [24] provide five higher-order traits including extroversion, neuroticism, agreeableness, con-

scientiousness, and openness, with their inventory often used by social science researchers [25].

Such research found extroversion positively correlates to wine tourists' spending on wine, frequent winery visits, engagement with winery activities, and venturing beyond wine tourism trails [26-28]. Neuroticism and openness to experience positively correlate with alcohol consumption, and wine drinkers tend toward openness to experience and agreeableness [29]. Openness to experience can indicate high cultural capital and seeking new experiences aligning with wine tourist demographics of university educated with higher than average income [28]. These results show the nuanced influence of personality on individual components of a CDE.

Predisposition to certain mood states can occur, with neurotics prone to negative mood. However, extroverts, predisposed to positive moods, activate mood repair to recall positive memories and relieve a negative state [30,31]. A recent study examining how personality moderates positive emotions elicited by CDEs showed low neuroticism scores (high scores indicating stress, worry, and pessimistic worldview) enhanced positive emotional responses to the wine and experiences [32]. While providing validity of Costa and McCrae's measure in applied research, the study did not provide insight into the interaction of individual traits and states while creating a sales relationship during a CDE.

2.2. Mood

Moods are consciously accessible affective states on a positive (e.g., elation) to negative (e.g., desolation) continuum occurring without a focused reference, forming slowly through cognitive appraisal of experiences, and generated internally, independent of an event or external stimuli [33]. Mood can be mediated by personality, is contagious within groups [34], and can influence the valence and intensity of an evoked emotion. Events provoking a positive emotion can create a positive mood, resulting in a dynamic mood/experience relationship where moods influence the perception of environmental stimuli while forming judgements [35]. Further, as neural circuits of the olfactory system and neural regions associated with emotion and mood overlap, odours associate with emotions, influencing mood [33]. However, previous association and preference for odours affect this influence, and the olfactory habituates background odour. So, while organic rural or fermentation scents may overwhelm a new cellar door visitor, they will soon be habituated and replaced with the aromas of wine.

Mood management theory and the hedonic contingency model posit that consumers are driven toward the positive end of the continuum, activating mood repair by eliminating or reducing the intensity to avoid despair [36]. Affect theory maintains that pleasant atmospheric cues assist mood repair, moving consumers toward a more positive mood, further supporting the importance of winescape and cellar door design [37]. Additionally, positive moods release dopamine, creating stronger memories and strengthening brand attachment [38] and purchase intention [39]. Importantly, a participant's mood before tasting the wines has been found to affect the product-evoked emotion significantly, and the absence of negative emotion was required to increase a willingness to spend [40]. Therefore, a consumer's mood before the CDE could moderate enjoyment, associated memories, liking of the wine, purchase, and revisit intentions.

2.3. Emotion

Emotions are neocortical appraisals of perceptions, including cognitive, motivational, affective, and expressive components, described through valence (positive/negative) and arousal (strong/weak) dimensions [33,41]. Generally intense, brief, specific to a stimulus, and affected by subjective perception, emotive responses can influence the purchase intentions of consumers [40,42], and increase consumer loyalty through enjoyable CDE [43]. Enjoyable CDEs increase the release of dopamine, which strengthens memories [44], leading to revisitation and an enduring loyal customer [20].

An infinite number of emotions exist [45], and componential emotion theory holds emotions as more than 'labels' to explain facial expressions communicating social judgements among a group [41]. Emotions are cognitive actions of processing and appraisal influencing behaviour, stimulating a response (i.e., approach), or inhibiting a response (i.e., retreat). Componential emotion theory was used to understand the influence of wine-evoked and experience-evoked emotion on the purchase intention or actual purchase of an exclusive wine [42], finding a significant influence of wine-evoked positive emotion on the intention to purchase. However, the study did not assess the emotional influence of an experience with wine as part of the experience. Participants were given an exclusive wine post-tour, creating two experiences: the tour and an exclusive wine. Therefore, this study may have only confirmed that a positive emotional response to exclusivity influences the intention to purchase.

The context of consumption can influence product-evoked emotions. A study of consumers of Australian shiraz in three different locations (laboratory, home, and

restaurant) showed stronger positive emotions, in the complete absence of negative emotions, increased willingness to pay higher prices for the exact wine in the restaurant context, regardless of the subjective value of liking [40]. A more recent study found that although tasting context did not influence on the liking of a cabernet sauvignon wine, emotional responses were influenced by context [46].

2.3. Hypotheses

Acknowledging the importance of understanding individual influences which contribute to the co-created CDE, the current study examined the influence of individual traits on actual purchases and WOM using data collected via a questionnaire completed during the CDE, testing the following hypotheses:

H1: State measures will have a greater influence than trait measures over outcome variables.
H2: Personality traits of neuroticism and openness to experience, and positive mood but negative emotion, will influence total spending.
H3: Personality traits of neuroticism and openness to experience, and negative emotion will influence the number of bottles purchased.
H4: Personality traits of agreeableness and extroversion and positive mood state will influence intention to recommend.
H5: Personality traits of extroversion, openness to experience, agreeableness, and a positive mood state will influence the judgement of CDE quality.

3. MATERIAL, METHODS AND DATA

3.1. Ethics

Based on the guidelines in the National Statement on Ethical Conduct in Human Research (Source: National Health and Medical Research Council), a university Human Research Ethics Committee granted ethics approval for the project on 2nd December 2020 (protocol number H20350).

3.2. Participants and method

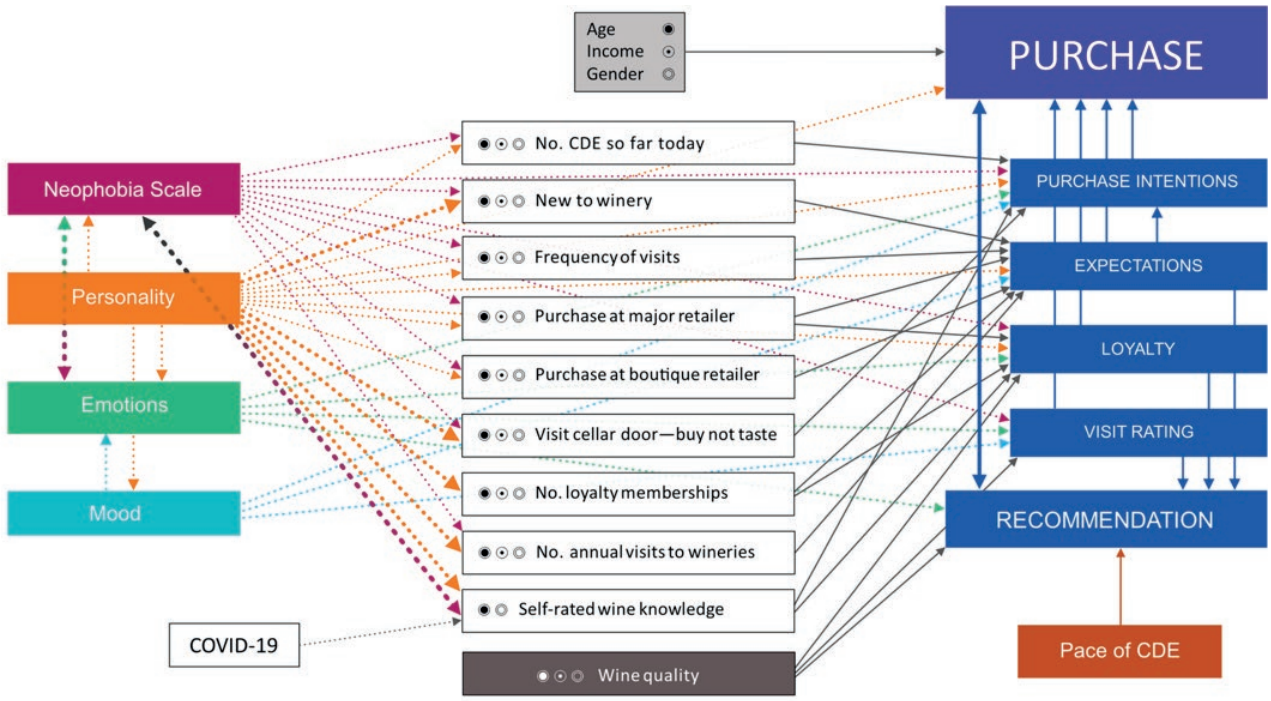
The cellar door survey was completed during the participant's cellar door experience. Surveys were accessed via a QR code in a laminated poster supplied to each cellar door. The survey contained the participant information statement, and the agreement to continue the survey was considered informed consent. Data was collected between May 2021 and November 2022 with 136 surveys for analysis. Participants included customers enjoying CDEs in various wine regions of Australia, including Canberra District, Hunter Valley, Shoalhaven, Coal River Valley, Tamar Valley, Clare Valley, Barossa Valley, and Coonawarra. Customers were approached by the researcher when on-site, invited to participate by the staff member conducting the tasting, or by self-selecting via the QR code on the display poster. Participation was voluntary, with an entry in a draw to win wine provided as a participation incentive.

3.3. Measures

The survey contained questions on demographics, wine purchasing habits, frequency of visiting cellar doors, wine neophobia (openness to experience new wine; [48]), expectations and evaluations of wine quality and experience, intentions to recommend, revisit, and purchase, as well as measures of personality [49]), mood [50] and emotions evoked by the wine tasted for customers [40].

4. DATA ANALYSIS

A Bayesian Network (BN) is a graphical representation of the joint probability distribution for all variables. Each is represented by a node with a dependency relationship between associated variables represented by a link [51,52]. This graphical representation is the qualitative component, which specifies the network structure and relies on dependence and independence statements among a set of random variables, their informational precedence, and their preference relationships. Relationships for the current study are outlined in a concept model developed by the lead researcher (see Figure 1), with dependent and independent variables connected by the expected direction of influence on and between variables based on prior knowledge. For example, as Danner et al. [40] found that the absence of negative emotion increases a willingness to pay for wine, emotion is expected to influence purchase intentions. Bayes' Theorem allows for mathematical assessments of the effects of different variables to be made in both directions. BNs compute both likely effects given specific values and likely causes of observed events. This quantitative component determines the conditional probability or evaluates the parameters of the BN and quantifies the strength of dependence relationships by applying probability and preference relations using utility theory [52]. Utility



Note. Dotted lines indicate *expected* influence of trait and state variables, based on prior knowledge, and solid lines expected influence of behaviour and outcome variables—line weight indicates expected strength of influence. Expected influence of age, income, and gender on input variables is indicated by the symbols ◉, ⊙, and ◎, respectively. Outcome variables are represented in UPPER CASE.

Figure 1. Concept model for lines of influence of the customer cellar door experience survey.

theory maintains individuals consistently rank choices dependent on preferences. Therefore decision outcomes rely on the value or utility to the individual. As such, BNs quantify local dependency relationships between a variable and its parent variables through links; then, all local dependency relationships are integrated based on the probability chain rule so that joint distribution of interrelationships of all variables can be determined [52].

Netica (Norsys Software Corp., 2021a) was used to create the BN in Figure 2. Clean datasets were denoted parent or child nodes with links depending on the relationship determined by the lead researcher as per the concept map in Figure 1. One of the benefits of creating a BN is being able to determine the influence of specific nodes on outcome variables [53, 54], allowing a deeper examination of influences on purchase and loyalty behaviour in the current study.

5. RESULTS

A total of 136 complete questionnaires were analysed. The joint distribution calculations for all variables contained within the network (see Figure 2) means any variable may be appointed an outcome variable, allowing inferential analysis to be completed for each level (i.e., 3 to 6 bottles, 100 to 200AUD, very likely) of different outcomes (i.e., bottles purchase, total spend, recommendation respectively) for each category (e.g., score range 22 to 30) of independent variables (e.g., Arousal-Calm). Please note the current study is part of a bigger study, with all variables from the cellar door survey included in the Bayesian Network. As such, only part of the whole network is discussed in the current article. One advantage of adopting Bayesian analysis is the ability to make specific observations of isolated nodes within the network [53,54]. As this article focuses on customer trait and state influences on the CDE, only the results for those variables are reported here. The strength of influence expressed as a percentage for each outcome variable is referred to as the 'Sensitivity to findings' in the Netica software. These percentage influences for each outcome variable decided for the current article are shown in Table 1 and then addressed individually.

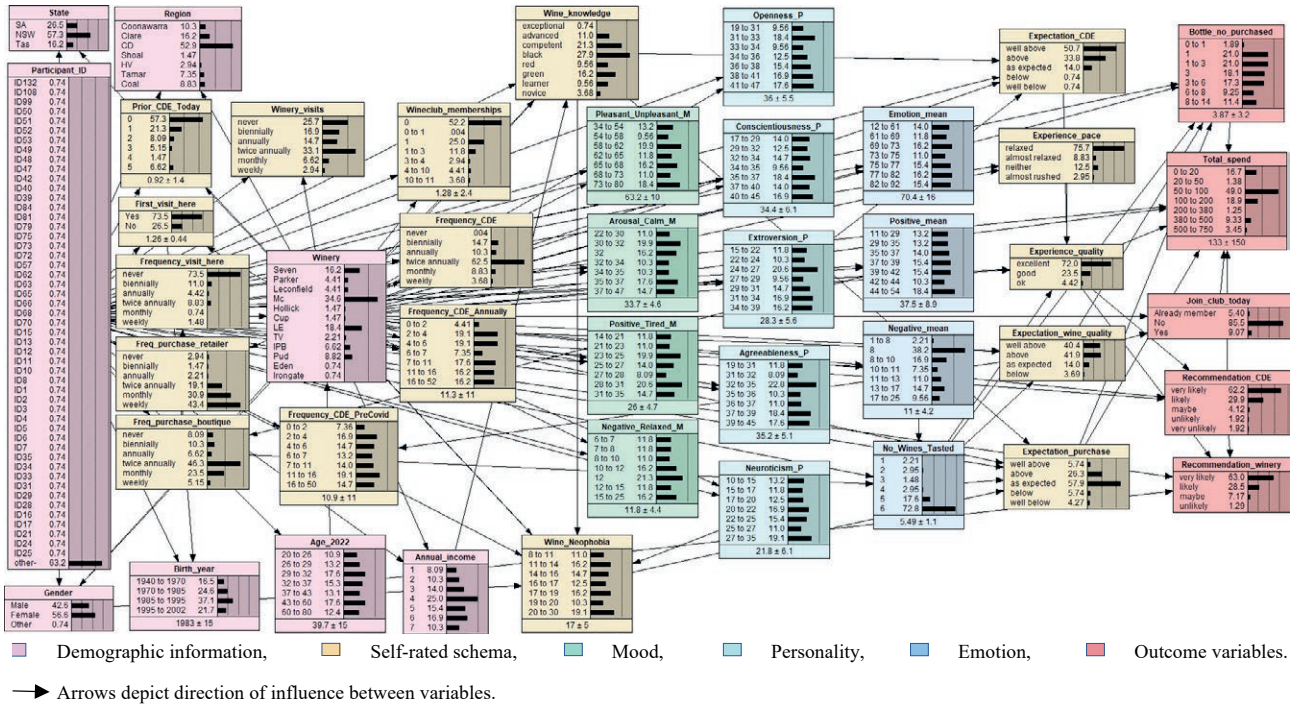


Figure 2. Cellar door experience customer survey Bayesian Network diagram.

Table 1. Sensitivity to findings for outcome variables of trait and state measures.

Variable	Total spend	Bottle no. purchased	CDE quality	Recommend CDE	Recommend Winery
Personality					
Openness to experience	1.70	4.00	6.46	10.30	8.24
Conscientiousness	0.54	1.41	6.34	9.79	9.71
Extroversion	2.00	4.34	4.76	7.58	5.29
Agreeableness	3.84	7.07	6.56	7.68	5.73
Neuroticism	4.12	8.24	7.11	12.90	13.50
Mood					
Arousal-Calm	8.49	12.20	8.94	8.73	7.44
Negative-Relaxed	2.56	1.59	4.54	9.66	12.90
Pleasant-Unpleasant	1.61	3.09	3.51	9.17	7.75
Positive-Tired	2.65	5.20	7.11	8.16	6.20
Wine evoked emotion					
Emotion - mean	2.82	5.59	17.00	13.50	10.30
Negative - mean	4.61	8.92	8.70	12.40	9.84
Positive - mean	3.76	8.21	12.80	12.50	9.23

5.1. Total spend

This outcome variable was most sensitive to the arousal-calm mood state, followed by a negative mood state, personality traits of neuroticism and agreeableness, and a positive mood state.

Higher average scores of arousal-calm mood state were associated with increased spending, meaning that participants who were feeling energetic and engaged with the CDE spent more on their purchases (see Table 2).

Whilst the next four variables are included in the inferential analysis of variables to which total spend

Table 2. Sensitivity of findings for 'Total spend' outcome variable.

Total spend AUD *M* 133 ± 150	Arousal-Calm Mood (8.49%) Range (22-47) *M* 33.7 ± 4.6	Negative Emotion (4.61%) Range (1-25) *M 11* ± 4.2	Neuroticism (4.12%) Range (10-35) *M* 21.8 ± 6.1	Agreeableness (3.84%) Range (19-45) *M* 35.2 ± 5.1	Positive Emotion (3.76%) Range (11-54) *M 37.5* ± 8.9
0-20	33.1	11.6	22.2	36.4	36.5
20-50	35.4	10.1	23.0	34.8	39.2
50-100	33.0	10.7	22.6	35.0	36.8
100-200	34.2	10.6	20.1	35.0	38.6
200-380	35.5	10.0	23.1	34.8	39.5
380-500	35.6	12.1	21.7	35.4	38.4
500-750	36.8	12.2	18.4	32.8	41.4

shows sensitivity, their sensitivity is half that of arousal-calm. Higher than mean scores for negative and positive emotion were associated with increased spending, meaning participants able to associate an emotional response to the wine were more likely to purchase more. However, a lack of negative wine evoked emotion (i.e., lowest negative scores and highest positive scores, which resulted in a lower than mean emotion score) did not indicate the highest total spend, as the highest total spend category was associated with higher than mean scores for both negative and positive emotion scores. Therefore, participants spend more when a range of emotions, both positive and negative, are aroused by the wine being tasted.

Regarding personality trait measures, scores in the lowest (10-15) and highest (25-35) categories of neuroticism were associated with lower-than-average total spend. Scores in the lowest (19-31) category of agreeableness were associated with the highest total spend of all agreeableness categories. Meaning participants who had the highest total spend were not necessarily displaying behavioural cues we usually associate with enjoyment (i.e., smiling).

5.2. Bottle number purchased

The number of bottles purchased was most sensitive to the arousal-calm mood measure, showing greater sensitivity to arousal-calm than the total spend variable. Of note is that bottles purchased has greater sensitivity to negative and positive wine evoked emotion than total spend (see Table 1).

Wine evoked emotions, and neuroticism showed similar sensitivity (see Table 3). Higher-than-mean scores of positive emotion were associated with higher-than-mean bottle number purchases but lower-than-mean for negative emotion, except for the highest number of bottles purchased. Therefore, the lower levels of negative wine evoked emotions result in higher-than-mean bottle number purchases.

Regarding neuroticism, the highest means were associated with lower-than-mean bottle purchases, but the lowest mean was associated with zero bottle purchases.

5.3. Cellar door experience quality

Ratings of experience quality, (measured on a 5-point Likert scale where 1 was awful and 5 was excellent) ranged from ok to excellent. CDE quality was most sensitive to wine evoked emotions. Meaning, emotional responses to the wines tasted had greater influence over the self-rated experience quality than mood or personality. Also, positive wine evoked emotions had a greater influence than negative emotions, meaning wines that evoked happiness for example had a greater influence over participants' rating of their experience than wines that evoked loneliness.

Arousal-calm was the most influential of the mood measures with higher-than-mean scores associated with an excellent rating. Neuroticism was the most influential personality trait with higher-than-mean scores associated with the lowest evaluation given by participants.

5.4. Intention to recommend experience

Intention to recommend (WOM) the CDE was most sensitive to wine-evoked emotions and the personality traits of Neuroticism and Openness. Higher-than-mean wine evoked emotions were associated with strong positive WOM. Lower-than-mean scores for neuroticism were associated with strong positive WOM. Higher-than-mean scores for positive but lower-than-mean scores for negative emotions were associated with strong positive WOM.

Table 3. Sensitivity of findings for 'Bottle no purchased' outcome variable.

Number of bottles purchased *M* 3.87 ± 3.2	Arousal-Calm Mood (12.2%) Range (22-47) *M* 33.7 ± 4.6	Negative Emotion (8.92%) Range (1-25) *M 11* ± 4.2	Neuroticism (8.24%) Range (10-35) *M* 21.8 ± 6.1	Positive Emotion (8.21%) Range (11-54) *M 37.5* ± 8.9
0	31.0	11.3	11.9	33.4
1	33.1	10.7	21.9	36.6
2	32.0	11.2	22.7	37.8
3	33.6	10.7	23.3	38.0
3-6	34.0	10.7	22.1	34.8
6-8	35.9	10.0	18.9	40.9
8-14	35.9	12.7	19.5	39.5

Table 4. Sensitivity of findings for 'Experience quality' outcome variable.

Experience Quality	Emotion Mean (17%) Range (12-92) *M* 70.4 ± 16	Positive Emotion (12.8%) Range (11-54) *M 37.5* ± 8.9	Arousal-Calm Mood (8.94%) Range (22-47) *M* 33.7 ± 4.6	Negative Emotion (8.7%) Range (1-25) *M 11* ± 4.2	Neuroticism (7.11%) Range (10-35) *M* 21.8 ± 6.1
Excellent (72.0%)	72.5	39.1	34.2	10.9	22.0
Good (23.5%)	67.5	34.4	32.3	11.5	21.2
OK (4.42%)	52.6	27.0	32.6	9.59	22.7

Table 5. Sensitivity of findings for 'Recommend CDE' outcome variable.

Intention to recommend cellar door experience	Emotion Mean (13.5%) Range (12-92) *M* 70.4 ± 16	Neuroticism (12.9%) Range (10-35) *M* 21.8 6.1	Positive Emotion (12.5%) Range (11-54) *M 37.5* ± 8.9	Negative Emotion (12.4%) Range (1-25) *M 11* ± 4.2	Openness (10.3%) Range (19-47) *M* 36 ± 5.5
Very likely (62.2%)	73.4	21.7	39.1	10.3	36.1
Likely (29.9%)	68.7	21.4	35.8	12.1	36.3
Maybe (4.12%)	52.9	24.7	32.2	14.8	35.0
Unlikely (1.29%)	62.0	25.0	32.4	11.7	31.8
Very unlikely (1.29%)	47.6	22.7	26.3	8.1	36.6

Higher-than-mean scores for openness to experience were associated with strong positive and strong negative WOM. Meaning while strong positively valenced emotional responses to the wine were associated with positive WOM, participants who were open to new experiences with a thirst for knowledge were sensitive to poor experiences increasing the possibility of negative WOM.

5.5. Intention to recommend winery

Intention to recommend (WOM) the winery as a whole was most sensitive to the personality trait of neuroticism, negative-relaxed mood, and wine evoked emotion (see Table 6).

This means participants who scored higher on the neuroticism trait, were in a more negative mood state and had lower emotional responses to the wine tasted were least likely to engage in positive WOM for the winery as a whole.

Of special note is that the personality trait of conscientiousness imparts greater influence on intention to recommend both the CDE (9.79%) and the winery as a whole (9.71%) than on total spend (0.54%).

6. CONCLUSIONS

Adopting a Bayesian network (BN) model the current study explored the complex cellar door sales rela-

Table 6. Sensitivity of findings for 'Recommend winery' outcome variable.

Intention to recommend winery as a whole	Neuroticism (13.5%) Range (10-35) *M* 21.8 6.1	Negative-Relaxed Mood (12.9%) Range (19-47) *M* 36 ± 5.5	Emotion Mean (10.3%) Range (12-92) *M* 70.4 ± 16
Very likely (63.0%)	21.3	36.4	72.6
Likely (28.5%)	21.8	35.1	70.4
Maybe (7.17%)	25.0	36.2	53.7
Unlikely (1.29%)	28.8	37.4	57.1

Table 7. Summary of findings for each hypothesis.

Hypothesis	Finding
State measures will have a greater influence than trait measures over outcome variables.	Supported for all outcome variables except the intention to recommend the winery as a whole.
Personality traits of neuroticism and openness to experience, positive mood but negative emotion will influence total spend.	Minimal influence of openness to experience, however, neuroticism was the most influential trait.
Personality traits of neuroticism and openness to experience and negative emotion will influence number of bottles purchased.	An absence of negative wine evoked emotion associated with higher bottle number purchases. While higher neuroticism means associated with lower bottle purchases, lowest mean associated with zero bottle purchase.
Personality traits of agreeableness and extroversion and positive mood state will influence intention to recommend.	Support only found for positive mood state. Neuroticism and openness to experience held greater influence than other traits.
Personality traits of extroversion, openness to experience, and agreeableness and a positive mood state will influence the judgement of CDE quality.	Support only found for positive mood state.

tionship co-created by staff and customers. The BN provided a mathematically coherent chart of influence and association for all independent and outcome variables. Thus answering hypotheses and informing the framework developed for CDEs (see Figure 3). Support for each hypothesis is outlined in Table 7.

Answering the call for research to explore psychological and consumer behaviour elements of the CDE, and these valuable findings regarding psychological traits and state inform the development of a framework (see Figure 3) for the interaction of customers and staff during a CDE, which when implemented will improve CDEs for all visitors regardless of wine involvement or which market segment they occupy.

Results show that customer state, rather than trait, is more influential, which is encouraging for staff as while traits tend to be constant across the lifespan, states are transient and can be changed [33]. Mood management theory and the hedonic contingency model maintain customers want to be at the positive end of the mood continuum [36]. Therefore, staff can use a CDE to move a customer's mood toward arousal through positive engagement with a happy smile and friendly gesture inviting any new arrivals to join them in the cellar door, creating a positive environment, moving the customer's mood state toward aroused and engaged which is more conducive to purchasing. Recent research has shown that staff hold customers' visual attention throughout the CDE [55], providing opportunities to utilise this focus beyond the greeting upon arrival.

Wine-evoked emotion was the most influential state or trait variable on experience quality rating and intention to recommend the experience. Further, the influence of wine-evoked emotion on all outcome variables emphasises the importance of wine being the focus of the cellar door. Staff should be able to provide more information than that which has been written for the tasting notes if required, emphasising the importance of increased investment in training and education for cellar door staff.

There are a few critical ways in which personality traits *do* influence the profitability of a CDE. Neuroticism has been associated with wine consumption [29]. The current study has shown neuroticism to be the more influential trait during a CDE, adding credence to wine being the focus for customers. Although slightly lower-than-mean levels were associated with higher total spending, the lowest levels were associated with no purchases. Customers with a higher neuroticism trait tend to overthink a situation and are prone to stress. Therefore, staff should provide a person-focused welcome

and tailor an experience to their customers. Openness to experience, also associated with wine consumption, was shown to be influential in the recommendation of the CDE and should be considered when developing a CDE seizing the opportunity to create positive WOM. Openness is often associated with creativity, intelligence, curiosity, and information-seeking behaviour. It is therefore essential to utilise the CDEs as an opportunity to educate both customers and staff. Invite customers to engage with the wine and winery, not through gimmicks, tea towels, or branded champagne stoppers, but through knowledge communicated by educated and engaging staff. Therefore, training and education become essential investments that create staff who can provide engaging CDEs [13]. Such education takes many forms and moves past purely technical aspects of wine production; for example, Rebecca Duffy is establishing a sensory garden at Holm Oak in Tasmania [56] allowing customers to experience the aromas found in their wines.

Importantly extroversion, a personality trait associated with wine tourists [26], has very little influence on purchases or intentions to recommend. Therefore, a more detailed understanding of CDE sales relationships co-created by staff with customers should be developed, with wine firmly centred as the product, rather than relying too heavily on tourism research. The CDE is the opportunity to develop a sales relationship [15], creating brand attachment resulting in enduring customers rather than an arena to conduct a tourism experience. Additionally, while the quality of the experience is paramount, the wine must be the focus. Participants who were more engaged and wine-focused were shown to spend more. Hence, an inference can be made from these results that wine-focused customers visit cellar doors to engage with cellar door staff. Whilst they enjoy the experience, their focus is wine, not entertainment.

The current study focused on a small section of a larger project as it allows a depth of understanding missed when addressing every complexity of the cellar door experience contained in the BN. Therefore, this discussion and the developed model are limited to providing a detailed understanding of the nuanced influence of these variables. While research has rightly called for a deeper understanding of the influence of personality, this study has only found a weak influence of customer traits on purchase and loyalty behaviours. It is, however, still important to consider the influence of traits and recognise their impact on delivering compelling cellar door experiences.

6.1. Managerial contributions

The framework in Figure 3 shows the CDE created with wine at its centre and recognises the importance of education and training flowing through all levels, including wine tourism.

Management should ensure two components of the cellar door experience: First, train and educate staff so they can provide wine-focused information relevant to their wines and their winery. A global knowledge of wine is only useful if staff can apply their knowledge to the winery and wine they are selling. Therefore, cellar door staff need not be sommeliers but open to learning and talking about the wines they sell. Education provides staff with the confidence required to engage customers in

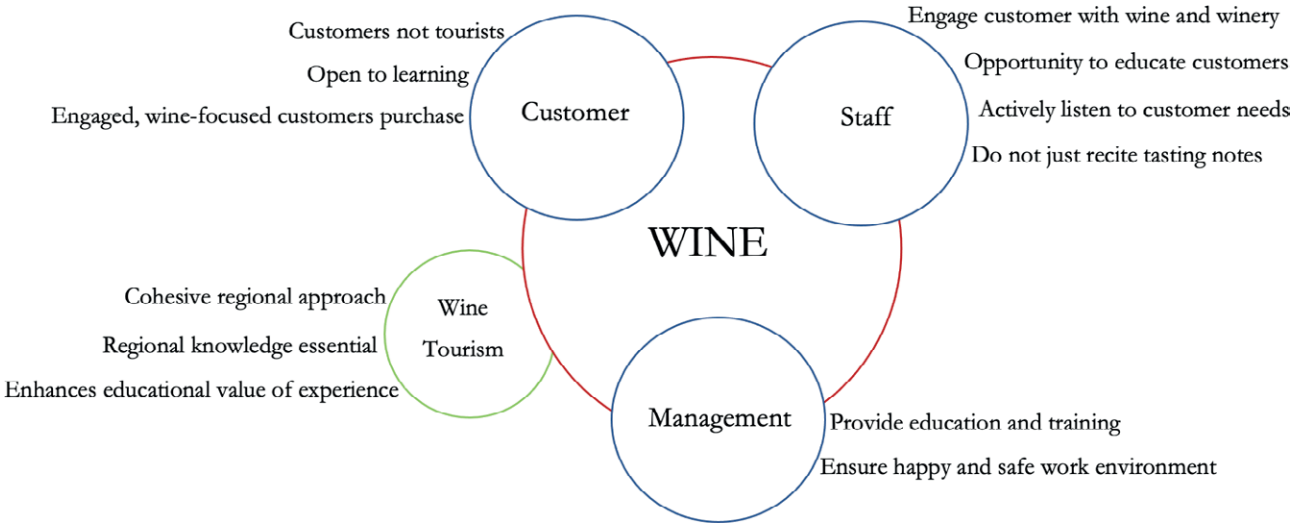


Figure 3. Cellar door experience framework.

conversation about the wines they are pouring and selling, but they also to actively listen to the customer [13] to determine customer needs. Enabling the staff to pitch the conversation to the customer's level of wine involvement, providing relevant wine knowledge, as an engaged and wine-focused customer spends more. Customers are open to learning and more likely to provide positive WOM where these needs are met. Taking the opportunity to engage novice wine consumers increases their wine knowledge and ignites in them the passion that powers the wine industry [5], transforming the novice into engaged wine-focused, enduring customers [15].

Second, management needs to provide a pleasant and safe working environment to provide the best opportunity for staff to be friendly and engaging so they can move a customer toward a positive and engaged mood. Keeping the customer happy and engaged is the objective. It is important to acknowledge that cellar door customers are not tourists. Wineries make wine to sell, not to entertain tourists. An engaging, educational, wine-focused CDE will provide sales and positive word-of-mouth while entertaining the odd tourist, all of which further contribute to the profitability of the cellar door and winery. Still, customers are there to buy wine rather than observe.

These findings do not diminish the importance of wine tourism, which is essential to promote at a regional level, and regional knowledge is essential for improving the educational value of a CDE. Therefore, wine tourism is included in the framework but deliberately placed behind the CDE. Wine tourism provides the means to refer to other wineries, recommend accommodation and restaurants and incorporate the surprise and delight of divulging local preferences. Such regional knowledge is important to keep the customer engaged and happy. However, a cohesive approach to wine tourism at a regional level is essential, working in tandem with all tourism providers to establish an ever-improving offering for all visitors. Each winery's CDE however must remain first and foremost about their own wine, and visitors to their winery approached as customers, there to be engaged, learn, and buy wine rather than simply spectate.

REFERENCES

[1] A.C. Campos, J. Mendes, P. Oom do Valle, N. Scott, Co-creation experiences: Attention and memorability, Journal of Travel & Tourism Marketing. (2016). https://doi.org/10.1080/10548408.2015.1118424

[2] A.-M. Kranzbühler, M.H.P. Kleijnen, R.E. Morgan, M. Teerling, The multilevel nature of customer experience research: An integrative review and research agenda, International Journal of Management Reviews. 20(2) (2018) 433–456. https://doi.org/10.1111/ijmr.12140 https://onlinelibrary.wiley.com/doi/abs/10.1111/ijmr.12140

[3] J. Ma, Gao, J., & Scott, N., Introduction: Creating memorable experiences, in Visitor Experience Design, N. Scott, Gao, J., and Ma, J., Editor, CABI, Oxfordshire UK, 2017 pp. 3–12.

[4] A. Whiteland, My view: The way forward for cellar door tourism beyond the pandemic, Australian and New Zealand Grapegrower and Winemaker. (678) (2020) 16–17. https://doi.org/10.3316/informit.324716808743103

[5] G. d'Ament, A.J. Saliba, T. Nayeem, Understanding the nature and significance of wine tourism using an Australian perspective, in Routledge Handbook of Wine Tourism, S.K. Dixit, Editor, Taylor & Francis, London, 2022 pp. 11–23.

[6] S. Squire, DtC boom follows COVID doom and gloom, Australian and New Zealand Grapegrower and Winemaker. (682) (2020) 72-76. https://winetitles.com.au/dtc-boom-follows-covid-doom-and-gloom/

[7] S. Hathaway, Inaugural direct-to-consumer survey identifies opportunities for wineries to connect with consumers and increase sales, Wine & Viticulture Journal. 34(1) (2019) 64–66. https://doi.org/10.3316/informit.388913080917737

[8] J. Ball, M. Stolle, Cellar doors: The impact of cellar doors: Design, experiences, and maximising customer relationships, Wine & Viticulture Journal. 34(4) (2019) 60–61. https://doi.org/10.3316/informit.008925211859130

[9] C. Szentpeteri, Sales and marketing: Direct to consumer sales-what's working for Australian wineries?, Australian and New Zealand Grapegrower and Winemaker. (657) (2018). https://doi.org/10.3316/ielapa.297891016321430

[10] S. Charters, J. Ali-Knight, Who is the wine tourist?, Tourism Management. 23(3) (2002) 311–319. https://doi.org/10.1016/S0261-5177(01)00079-6

[11] E. Pomarici, M. Lerro, P. Chrysochou, R. Vecchio, A. Krystallis, One size does (obviously not) fit all: Using product attributes for wine market segmentation, Wine Economics and Policy. 6(2) (2017) 98–106. https://doi.org/10.1016/j.wep.2017.09.001

[12] J. Bruwer, E. Rueger-Muck, Wine tourism and hedonic experience: A motivation-based experiential view, Tourism and Hospital-

ity Research. 19(4) (2019) pp.488-502. https://doi.org/10.1177/1467358418781444

[13] G. d'Ament, T. Nayeem, A.J. Saliba, Convivial connection between staff and customer Is key to maximising profitable experiences: An Australian cellar door perspective, Foods. 11(19) (2022) 3112. https://doi.org/10.3390/foods11193112

[14] M. Gómez, M.A. Pratt, A. Molina, Wine tourism research: A systematic review of 20 vintages from 1995 to 2014, Current Issues in Tourism. (2018) 1–39. https://doi.org/10.1080/13683500.2018.1441267

[15] G. d'Ament, T. Nayeem, A.J. Saliba, Do we really remember the view? The cellar door schema and its contribution to memorable experiences: Recommendations for cellar door practices, Food Research International. 174 (2023) 113611. https://doi.org/10.1016/j.foodres.2023.113611

[16] M.R. Jalilvand, N. Samiei, The impact of electronic word of mouth on a tourism destination choice: Testing the theory of planned behavior (TPB), Internet research. 22(5) (2012) 591–612. https://doi.org/10.1108/10662241211271563

[17] A. Ansary, N.M.H. Nik Hashim, Brand image and equity: the mediating role of brand equity drivers and moderating effects of product type and word of mouth, Review of managerial science. 12(4) (2018) 969–1002. https://doi.org/10.1007/s11846-017-0235-2

[18] J. Bruwer, M. Reilly, The power of word-of-mouth communication as an information source for winery cellar door visits, Australian and New Zealand Wine Industry Journal. 21(3) (2006) 43–51.

[19] A.C. Campos, J. Mendes, P. Oom do Valle, N. Scott, Co-creation of tourist experiences: a literature review, Current Issues in Tourism. 21(4) (2018) 369–400. https://doi.org/10.1080/13683500.2015.1081158

[20] L. Skavronskaya, B. Moyle, N. Scott, The experience of novelty and the novelty of experience, Frontiers in Psychology. 11 (2020) 322. https://doi.org/10.3389/fpsyg.2020.00322

[21] A. Caliskan, Applying the right relationship marketing strategy through big five personality traits, Journal of Relationship Marketing. 18(3) (2019) 196–215. https://doi.org/10.1080/15332667.2019.1589241

[22] J. Bruwer, K. Alant, The hedonic nature of wine tourism consumption: An experiential view, International Journal of Wine Business Research. 21(3) (2009) 235–257. https://doi.org/10.1108/17511060910985962

[23] H.J. Eysenck, S.B. Eysenck, Personality structure and measurement London: Routledge. 1969.

[24] P.T. Costa, R.R. McCrae, Domains and Facets: Hierarchical Personality Assessment Using the Revised NEO Personality Inventory, Journal of personality assessment. 64(1) (1995) 21–50. https://doi.org/10.1207/s15327752jpa6401_2

[25] R. Leung, R. Law, A review of personality research in the tourism and hospitality context, Journal of Travel & Tourism Marketing. 27(5) (2010) 439–459. https://doi.org/10.1080/10548408.2010.499058

[26] G. Galloway, R. Mitchell, D. Getz, G. Crouch, B. Ong, Sensation seeking and the prediction of attitudes and behaviours of wine tourists, Tourism Management. 29(5) (2008) 950–966. https://doi.org/10.1016/j.tourman.2007.11.006

[27] M. Pratt, Four wine tourist profiles, 8th International Conference of the AWBR, Geisenheim University, Geisenheim, Germany, 2014. http://academyofwinebusiness.com/wp-content/uploads/2014/07/TE06_Pratt_Marlene.pdf

[28] M. Pratt, Profiling wine tourists, more than just demographics, 6th Academy of Wine Business Research International Conference, Bordeaux Management School, Bordeaux, France, 2011. http://academyofwinebusiness.com/wp-content/uploads/2011/09/85-AWBR2011_Pratt.pdf

[29] G.W. Gustavsen, K. Rickertsen, Personality traits and consumption of wine and beer, Journal of Wine Economics. 14(4) (2019) 392–399. https://doi.org/10.1017/jwe.2019.34

[30] C.L. Rusting, Interactive effects of personality and mood on emotion-congruent memory and judgment, Journal of personality and social psychology. 77(5) (1999) 1073. https://doi.org/10.1037/0022-3514.77.5.1073

[31] S. Kritzler, J. Krasko, M. Luhmann, Inside the happy personality: Personality states, situation experience, and state affect mediate the relation between personality and affect, Journal of Research in Personality. 85 (2020) 103929. https://doi.org/10.1016/j.jrp.2020.103929

[32] I. Leri, P. Theodoridis, How do personality traits affect visitor's experience, emotional stimulation and behaviour? The case of wine tourism, Tourism Review. (2020). https://doi.org/10.1108/TR-05-2019-0148

[33] I. Kontaris, B.S. East, D.A. Wilson, Behavioral and neurobiological convergence of odor, mood and emotion: A review, Frontiers in Behavioral Neuroscience. 14 (2020). https://doi.org/10.3389/fnbeh.2020.00035

[34] X.-Y. Liu, Y. Liu, The service smile chain: linking leader emotions to customer outcomes, The Service Industries Journal. 40(5-6) (2020) 415–435. https://doi.org/10.1080/02642069.2018.1509958

[35] C.J. White, Towards an understanding of the relationship between mood, emotions, service quality and customer loyalty intentions, The Service Industries Journal. 26(8) (2006) 837–847. https://doi.org/10.1080/02642060601011624

[36] C.R. Noland, Positive or negative vibes: Does mood affect consumer response to controversial advertising?, Journal of Marketing Communications. 27(8) (2021) 897–912. https://doi.org/10.1080/13527266.2020.1795911

[37] F.-C. Pan, S.-J. Su, C.-C. Chiang, Dual attractiveness of winery: atmospheric cues on purchasing, International Journal of Wine Business Research. 20(2) (2008) 95–110. https://doi.org/10.1108/17511060810883731

[38] F. Murshed, A. Dwivedi, T. Nayeem, Brand authenticity building effect of brand experience and downstream effects, Journal of Product & Brand Management. 32(7) (2023). https://doi.org/10.1108/JPBM-02-2021-3377

[39] U.R. Orth, R.C. Crouch, J. Bruwer, J. Cohen, The role of discrete positive emotions in consumer response to place-of-origin, European Journal of Marketing. (2020). https://doi.org/10.118/EJM-05-2018-0353

[40] L. Danner, R. Ristic, T.E. Johnson, H.L. Meiselman, A.C. Hoek, D.W. Jeffery, S.E. Bastian, Context and wine quality effects on consumers' mood, emotions, liking and willingness to pay for Australian Shiraz wines, Food Research International. 89 (2016) 254–265. https://doi.org/10.1016/j.foodres.2016.08.006

[41] V. Shuman, E. Clark-Polner, B. Meuleman, D. Sander, K.R. Scherer, Emotion perception from a componential perspective, Cognition and Emotion. 31(1) (2017) 47–56. https://doi.org/10.1080/02699931.2015.1075964

[42] J. Pelegrín-Borondo, C. Olarte-Pascual, G. Oruezabala, Wine tourism and purchase intention: a measure of emotions according to the PANAS scale, Journal of Wine Research. 31(2) (2020) 101–123. https://doi.org/10.1080/09571264.2020.1780573

[43] J. Bruwer, M. Coode, A. Saliba, F. Herbst, Wine tourism experience effects of the tasting room on consumer brand loyalty, Tourism Analysis. 18(4) (2013) 399–414. https://doi.org/10.3727/108354213X13736372325957

[44] A.J. Duszkiewicz, C.G. McNamara, T. Takeuchi, L. Genzel, Novelty and dopaminergic modulation of memory persistence: a tale of two systems, Trends in neurosciences. 42(2) (2019) 102–114. https://doi.org/10.1016/j.tins.2018.10.002

[45] F. Wang, J. Yang, F. Pan, R.C. Ho, J.H. Huang, Neurotransmitters and emotions, Frontiers in Psychology. 11 (2020) 21. https://doi.org/10.3398/fpsyg.2020.00021

[46] D.D. Torrico, Y. Han, C. Sharma, S. Fuentes, C. Gonzalez Viejo, F.R. Dunshea, Effects of context and virtual reality environments on the wine tasting experience, acceptability, and emotional responses of consumers, Foods. 9(2) (2020) 191. https://doi.org/10.3390/foods9020191

[47] National Health and Medical Research Council. The National Statement on Ethical Conduct in Human Research 2018 [cited 2021 9 November]. (1864962755).

[48] R. Ristic, T.E. Johnson, H.L. Meiselman, A.C. Hoek, S.E. Bastian, Towards development of a Wine Neophobia Scale (WNS): Measuring consumer wine neophobia using an adaptation of The Food Neophobia Scale (FNS), Food Quality and Preference. 49 (2016) 161–167. https://doi.org/10.1016/j.foodqual.2015.12.005

[49] O.P. John, E.M. Donahue, R.L. Kentle, Big five inventory, Journal of Personality and Social Psychology. (1991). https://doi.org/10.1037/t07550-000

[50] J.D. Mayer, Y.N. Gaschke, The experience and meta-experience of mood, Journal of Personality and Social Psychology. 55(1) (1988) 102–111. https://doi.org/10.1037/0022-3514.55.1.102

[51] J. Pearl, Probabilistic reasoning in intelligent systems. Networks of Plausible Inference, ed. M.B. Morgan and D. Pearl. Morgan Kaufmann Publishers, Inc. 1988. https://doi.org/10.1016/C2009-0-27609-4

[52] U.B. Kjaerulff, A.L. Madsen, Bayesian Networks and Influence Diagrams. A Guide to Construction and Analysis. Second edition ed. Information Science and Statistics, ed. M. Jordan, J. Kleinberg, and B. Scholkopt. New York, NY 10013, USA: Springer. 2013. https://doi.org/10.1007/978-1-4614-5104-4

[53] L. Kaikkonen, T. Parviainen, M. Rahikainen, L. Uusitalo, A. Lehikoinen, Bayesian networks in environmental risk assessment: A review, Integrated Environmental Assessment and Management. 17(1) (2021) 62–78. https://doi.org/10.1002/ieam.4332

[54] C.A. Pollino, C. Henderson. (2010). Bayesian networks: A guide for their application in natu-

ral resource management and policy. (14). Canberra: Australian Government Retrieved from https://www.utas.edu.au/__data/assets/pdf_file/0009/588474/TR_14_BNs_a_resource_guide.pdf

[55] G. d'Ament, A.J. Saliba, T. Nayeem, What are you looking at? Visual attention during the co-created cellar door experience: customer and staff perspectives from Australian experiences, International Journal of Wine Business Research. (2022). https://doi.org/10.1108/IJWBR-01-2022-0006

[56] E. Cooper-Douglas. (2023, Wednesday 4th January 2023). Sensory garden helps drinkers better taste the notes and features of Tasmanian wine. ABC. https://www.abc.net.au/news/2023-01-04/sensory-garden-helps-drinkers-taste-notes-tasmanian-wine/101820282

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Amatucci, A., Ventura, V., & Frisio, D. (2024). Performance and efficiency of national innovation systems: lessons from the wine industry. *Wine Economics and Policy* 13(1): 63-80. doi: 10.36253/wep-14637

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Performance and efficiency of national innovation systems: lessons from the wine industry

Achille Amatucci[1], Vera Ventura[1,*], Dario Frisio[2]

[1] *Department of Civil, Environmental, Architectural Engineering and Mathematics, University of Brescia, via Branze 43, 25121 Brescia, Italy*
[2] *Department of Environmental Science and Policy, University of Milan, Via Celoria 2, 20133 Milano, Italy*
E-mail: achille.amatucci@unibs.it; vera.ventura@unibs.it; dario.frisio@unimi.it
*Corresponding author.

Abstract. The multiplicity of factors involved in the innovation process makes its measurement and evaluation a complex endeavor. In this study we propose a new approach to measure and decompose the efficiency of national innovation systems in the wine industry considering the relationship between the innovation environment and economic performance. The analysis applies the data envelopment analysis approach to quantify the relative efficiency of each national system using a set of four indicators to describe the innovative environment in the wine industry as model inputs, and an index of international market performance as output. The results demonstrate a clear perspective of the innovation process within the wine industry, identifying the systems that efficiently use the available resources and those that encounter difficulties in translating innovation into economic performance. The proposed approach also captures the dynamics of the international innovation landscape in the wine industry, providing potential country-level strategies and opportunities to increase innovation systems' efficiency.

Keywords: efficiency, DEA, wine industry, innovative performance.

1. INTRODUCTION

Innovation is a multifaceted concept that encompasses numerous spheres of technological, economic, and social activity, from research and development (R&D) to public and private investments, from production to application and commercialization of new goods or services, representing a crucial driver of economic change [1,2]. A key approach for understanding the innovation process is to chart the progression of perceptions of innovation over the past two decades. In the past, understanding the innovation process was centered on R&D-based product technology innovation for economists and policymakers. Such innovation was conducted by a highly educated workforce in R&D-intensive firms, and the processes leading to such innovation

was conceptually perceived as being closed, internal, and localized. Technological breakthroughs were deemed to be radical and disruptive and at the global frontier of knowledge [3]. Today, the ability to innovate is increasingly considered to be related to the capability to leverage new technological combinations, encompassing the concept of incremental innovation [4]. Therefore, comprehending how innovation evolves and the impact that incremental forms of innovation can have on economic development are key aspects for understanding and guiding innovation processes [5].

The wine industry can serve as an example of how the agri-food sector's innovation landscape has shifted in recent decades, with the growth of the international wine trade due to market liberalization, the emergence of new players, and changes in consumer behavior [6], [7]. Armed with new technological capabilities, emerging producers have challenged the innovative frontier by creating new technologies, organizational structures, and markets [8]. The success of new entrants in eroding the market share of traditional producers is primarily attributable to ongoing experimentation, development, and innovation [9]. In response, traditional producers have increased R&D efforts, resulting in improved product quality, branding, diversification, and conferring higher unit values to innovative production systems with barriers to entry and high local value added [10]. Consequently, wine has been transformed from a processed agricultural product into a highly diversified and innovative product undergoing a decommodification process [11].

Compared with other sectors, measuring innovation in the wine industry poses a greater challenge due to its distinctive characteristics, such as a high concentration of small and medium-sized enterprises [12], family ownership [13], dependence on a specific local terroir for wine production [14,15], tradition-oriented operations [16], fragmented business and knowledge networks [17], and reliance on tacit information [18,19]. A significant challenge for measuring innovation in the wine industry is identifying metrics to accurately reflect its complexity and multidimensionality. This requires a comprehensive analytical approach that encompasses entire national innovation systems [20].

This study addresses the conceptual and practical challenges to understanding and directing the fundamentals of innovation in the wine sector at the national level. We propose a novel approach for quantifying efficiency and decomposing the inefficiency of national innovative systems in the wine industry considering the relationship between the innovation process, intellectual property rights ownership, and economic performance. The assessment is designed to provide a comprehensive overview of national wine industry innovation systems by examining five indices, based on the data envelopment analysis (DEA) approach to calculate the relative efficiency of each national system as decision making unit (DMU). The indices include four input indices to capture elements of the economy that enable and facilitate innovation activities, and one output index to examine international market performance. Investigating performance in foreign markets reveals systems' adoption of the contemporary concept of innovation, promoting organizational development, implementation of technological change, and investment in training and education to maintain an approach of continuous learning and adaptation [21].

2. LITERATURE REVIEW

Numerous studies on innovation in the wine industry have relied heavily on the resource-based view (RBV) theory introduced by Barney in 1991 [22]. This theory argues that competitive advantage can be achieved by strategically managing human resources, technological capabilities, financial resources, and R&D activities [23,24]. The dynamic capabilities and knowledge-based vision extensions respectively proposed by Easterby-Smith and Prieto in 2008 and Grant in 2015 [25,26] have also been relevant to this approach. In the RBV theory, internal resources must be heterogeneous and immobile to be considered as resources for sustained competitive advantage. However, in the competitive global environment of the wine industry, firms' key factors for success include timely response, flexibility, speed of product innovation, and effective managerial capabilities to redistribute internal or external competencies [27,28]. Therefore, the dynamic capabilities perspective emphasizes a system's ability to build, integrate, and reconfigure capabilities in response to rapid changes [29].

Another approach is diffusion theory, which was proposed by Rogers in 1962 [30] to analyze how innovations are communicated and adopted over time within a social system. The evolutionary theories advanced by Nelson and Winter and Dosi in 1982 [31,32] view innovation as a path-dependent process that emerges from interactions between multiple actors that is then tested in the market. Other innovation theories such as Kline and Rosenberg's (1986) chain model [33] and innovation systems theory [34-36] emphasize innovation as a complex process that involves interactions and feedback loops between public and private actors.

The complex activities and relationships related to innovation represent significant challenges for measure-

ment. Innovation measurement methods start by covering a defined scope such as a sector of interest, a jurisdiction, or a geographic area where data are collected [37]. The practical aspect of quantifying innovation begins with an analysis of existing potential to effectively use it [38]. Innovation potential refers to the ability of a system to use internal resources efficiently under current circumstances to improve, manage, or optimize a product or process [39]. Many authors have considered innovative potential to be a composite of several factors and resulting metrics have generally included composite synthetic indicators. The solution adopted by the drafters of the Frascati Manual, which is the Organization for Economic Co-operation and Development's (OECD) operational statistical manual for R&D data collection [40], was to draw up definitions of research activities and introduce data on expenditure and/or human resources devoted to these activities. Thus, the concept of measuring R&D is economic in nature, and the resulting datasets are collections of economic indicators that are compatible with industrial datasets and national accounts [41]. The Global Innovation Index [5] is presented as a series of rankings that are structured with metrics at the index, subindex, or indicator levels and used to monitor performance over time and compare developments with economies in different regions or income group classifications.

Innovation capacity has predominantly been understood in terms of innovative performance [42]; however, its measurement has not been thoroughly developed in previous research at the same level as innovation potential, and authors' approaches to measuring have primarily been based on frontier techniques. Murillo-Zamorano (2004) [43] offered a thorough overview of the predominant methods of frontier analysis, identifying two analytical methodologies that are used in the economic and statistical literature, including econometric estimation of cost or production functions and mathematical programming techniques. The two strands of analysis are referred to as parametric such as deterministic frontier analysis and stochastic frontier analysis and nonparametric, including DEA and free disposal hull methods. Parametric analyses require the a priori explication of a production function, while nonparametric approaches are characterized by the possibility of determining the relative efficiency of similar DMUs through linear programming techniques without the need to specify the relative significance of different factors of production and prices or the distribution of efficiency. A comprehensive review of the application of parametric and nonparametric frontier techniques to analyze R&D system efficiency was provided by Bonaccorsi and Daraio (2005) [44]. The nonparametric method of frontier analysis chosen for this study is the DEA approach, developed by Charnes, Cooper, and Rhodes (1978) (CCR). We use DEA to empirically measure the relative efficiency of the sample of national innovation systems.

3. METHODOLOGY AND DATA

3.1. Data collection

This section outlines the data used to profile the sample nations' wine economies, including the title, description, definition, and source for each of the 29 indicators included in the analysis. The analysis encompasses data for the top 35 wine-producing nations from 2016 to 2019, to exclude the effects of the COVID-19 pandemic. Four years are considered to ensure the accuracy of measuring the delay in the administrative processes for obtaining intellectual property rights for an invention (18–24 months), and the time it takes to commercialize an innovation. Some indicators are scaled during the calculation to make them comparable across economies, in relation to other comparable indicators or through division by gross domestic product (GDP) in current US dollars, GDP at purchasing power parity in international dollars (GDP PPP$) and gross national income (GNI). The selection of the subindices that contribute to the construction of individual indices is based on their relevance to the specific innovation domain, scientific literature review, data availability, and the value of correlation measured post hoc to verify statistical consistency. In summary, the model is constructed using four input indices, including a production structure, institutional and business environment, human capital and research, and knowledge and technology indices and one output index covering international market performance. Descriptions of the variables and data sources are detailed below.

Production structure index:

- *Share of world grapevine area*: This index reflects the viticultural area in each country, which is obtained by averaging individual annual percentage values from 2016 to 2019 (International Organization of Vine and Wine (OIV), Annual Database of global wine markets).
- *Share of total agricultural crop area under vines*: This index provides an assessment of the national weight of viticulture in terms of occupied land and is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets; OECD data; the United Nations Food and Agricultural Organization's FAOSTAT database).

- *Vineyard area per million US$ of real GDP*: This index determines the average vineyard area scaled by real GDP for individual years from 2016 to 2019. The index quantifies the planted vineyard area for comparison across different economies (OIV, Annual Database of global wine markets; OECD).
- *Share of world wine production volume*: This index reflects the amount of wine produced by each nation in relation to global production and is obtained by averaging individual percentage values for each year from 2016 to 2019 (OIV, Annual Database of global wine markets).
- *Volume of wine production (1,000 liters) per US$ millions of real GDP*: This index quantifies national wine production volume, which is measured in thousands of liters and scaled by millions of US dollars of real GDP and obtained by averaging the individual values for each year from 2016 to 2019 (OECD data; OIV, Annual Database of global wine markets).
- *Wine self-sufficiency in terms of volume*: This national supply balance index quantifies each country's degree of specialization in wine production and is obtained by averaging data for 2016 to 2018; however, there are missing values in 2019 (OIV, Annual Database of global wine markets).
- *Share of world wine consumption volume*: This index is obtained by averaging individual values from 2016 to 2019 and is a proxy for the historicity of the wine sector in the country (OIV, Annual Database of global wine markets).
- *Wine consumption as a proportion of total alcohol consumption*: This index quantifies wine consumption as a proxy for its historicity, stripped of cultural habits related to alcohol in general, which is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets).

Institutional and business environment index:

- *Cost of business startup procedures (% of GNI per capita)*: The cost of registering a new enterprise is normalized as a percentage of GNI per capita. This index is obtained by averaging individual values from 2016 to 2019 to quantify the impact of institutional and bureaucratic structure on the commercialization (thus, new business development) of innovations (World Bank).
- *Ease of doing business score (0 = lowest performance to 100 = best performance)*: These scores identify benchmark economies to compare the best regulatory practices. Economies are scored on a scale of 0 to 100, where 0 represents the worst regulatory performance and 100 represents the best regulatory performance. The index is obtained by averaging the individual values from 2016 to 2019 (World Bank).
- *Startup procedures to register a business (number)*: Startup procedures refer to the requirements for starting a business, including interactions to obtain necessary permits and licenses and complete all inscriptions, verifications, and notifications to begin operations. The index is obtained by averaging individual annual values from 2016 to 2019 and is a proxy for the impact of bureaucracy on the innovation system (World Bank).
- *Time required to start a business (days)*: This index measures the number of calendar days required to complete the procedures for legal business operation. If a procedure can be expedited at an additional cost, the fastest procedure is chosen, regardless of the cost. The index is obtained by averaging individual annual values from 2016 to 2019 (World Bank).
- *Charges for the use of intellectual property, payments (balance of Payment in current US$)*: This index quantifies the charges for the use of intellectual property, referring to payments and collections between residents and nonresidents for authorized use of proprietary rights (such as patents, trademarks, copyrights, industrial processes, and designs, including trade secrets) and for the use of original or prototype products (such as computer software) and related rights through licensing agreements. These data are expressed in current US dollars, and the index is obtained by averaging annual values from 2016 to 2019 (International Monetary Fund, Balance of Payments Statistics Yearbook).
- *Agriculture, forestry, and fishing, value added (% of GDP)*: Value added refers to the net output of the indicated agribusiness sectors after summing all outputs and subtracting intermediate inputs. This is calculated without deducting depreciation of manufactured goods or depletion and degradation of natural resources. The index is then normalized as a proportion nations' real GDP and obtained by averaging annual values from 2016 to 2019 (OECD; World Bank).

Human capital and research index:

- *Employment in agriculture (% of total employment)*: The agriculture sector includes activities in agriculture, hunting, forestry, and fishing, in accordance with division 1 (ISIC 2), categories A–B (ISIC 3), or category A (ISIC 4). This index is obtained by averaging estimated values for each year from 2016

to 2019 (the United Nations International Labor Organization's ILOSTAT database).
- *Share of tertiary education graduates from agriculture programs*: This index quantifies the proportion of total tertiary education graduates, regardless of age, to the share of the group that officially corresponds to agricultural education programs. The index is obtained by averaging values for each year from 2016 to 2019 (the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database).
- *Gross Expenditure on R&D (% of GDP)*: This index quantifies total domestic expenditure on R&D in each period as a proportion of GDP. Intramural R&D expenditure is all R&D expenditure made within a statistical unit or economic sector in each period, regardless of the source of funding. The index is obtained by averaging annual values from 2016 to 2019 (UNESCO Institute for Statistics online database; Eurostat; OECD, Database of Principal Science and Technology Indicators; Ibero-American and Inter-American Network of Science and Technology Indicators).
- *Researchers, full-time equivalent (per million population)*: R&D researchers are professionals engaged in the conception or creation of new knowledge. Full-time equivalent quantifies the average annual time devoted to the activity (if an individual worked for 6 months it is counted as 0.5 for the reference year). The index is normalized per million inhabitants and obtained by averaging individual annual values from 2016 to 2019 (UNESCO Institute for Statistics online database; Eurostat; OECD, Main Science and Technology Indicators database; Ibero-American and Inter-American Network of Science and Technology Indicators).

Knowledge and technology index:
- *Wine PCT Patent Families/billions GDP PPP$*: The number of wine-related Patent Co-operation Treaty (PCT) patent families filed in at least two patent systems, scaled per billion GDP PPP$. A PCT application is defined as an international patent application administered by the World Intellectual Property Organization (WIPO). The PCT system makes it possible to simultaneously obtain patent protection for an invention in several countries by filing a single international patent application. The origin of PCT applications is defined by the residence of the first applicant. Data are available only for economies that are PCT contracting states (156 to date). Data are scaled by GDP in PPP$ (billion). A patent family is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. A patent is a set of exclusive rights granted by law to applicants for new, nonobvious, and industrially applicable inventions, and is valid for a limited period (usually 20 years) and in a defined territory. The patent system is designed to encourage innovation by providing innovators with exclusive, time-limited legal rights, which allows them to reap the benefits of the initial innovative activity. The index is obtained by using a time filter from January 1, 2016 to December 31, 2019 for the date of application (WIPO; International Monetary Fund; Questel Orbit Intelligence).
- *National wine tech share*: This index quantifies the proportion of the number of wine-related PCT patents to the total number of PCT patents from the individual country from 2016 to 2019. The index provides the relative weight of innovative production in the wine industry compared with the entire national innovation system (WIPO; Questel Orbit Intelligence).
- *Patent intensity*: This index examines the number of PCT patents with the word wine in the title or abstract in relation to the value of wine exports as a proportion of real GDP. The index is obtained using the average annual values from 2016 to 2019 to analyze patent intensity in relation to the significance of the wine industry at the national level. Countries with a high patent propensity but a small international wine market in the national economy will receive a higher value. (OIV, Annual Database of global wine market; OECD; World Bank; Questel Orbit Intelligence).
- *Share of international scientific articles published (wine)*: This index quantifies the proportion of international articles published in the wine field from 2016 to 2019 (Web of Science; Scopus).
- *Number of science and technology journal articles (per billion GDP PPP$):* This index measures the number of wine-related articles published in the fields of science and technology from 2016 to 2019. Articles are quantified and assigned to each economy based on the institutional addresses provided in each article. Data are reported per billion GDP PPP$ (Web of Science; OECD).

International market performance index:
- *Share of world wine export value*: This index measures the proportion of the value of wine exports in the world share. The index is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets).

– *Share of world wine export volume*: The proportion of the volume of wine exports in the world share. The index is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets).
– *Export as % of wine production volume*: Proportion of wine exported by volume in relation to production. The index is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets).
– *Volume of wine exports per million dollars of real GDP*: This index quantifies the volume (1,000 liters) of wine exports per million US dollars as a proportion of real GDP. The index is obtained by averaging annual values from 2016 to 2019 and allows for a comparison between different economies in relation to the significance of the wine industry within the country (OIV, Annual Database of global wine markets).
– *Share of wine exports in the value of all merchandize exports*: This index measures the relative weight of

Table 1. Descriptive statistics of the subindices used to construct the indices.

	Indices	Sub-indices	Mean	Median	St. dev.	Kurtosis	Skewness	Min	Max
Input	Production structure	Share of world vine area	2.42%	0.90%	0.03	3.03	2.02	0.02%	12.57%
		Vine area as share of total crop	2.51%	0.86%	0.03	1.19	1.45	0.02%	11.02%
		Vine area (ha) per million real GDP	0.608	0.282	1.18	24.386	4.635	0.001	6.856
		Share of world wine production (volume)	2.71%	0.88%	0.04	4.42	2.29	0.02%	16.50%
		Wine prod (.000 litres) per million real GDP	1.716	0.975	1.91	1.515	1.261	0.002	7.833
		Wine self-sufficiency	126.87%	103.84%	1.23	5.64	2.18	0.56%	552.86%
		Share of world wine consumption (volume)	2.50%	1.14%	0.03	3.25	1.96	0.08%	13.22%
		Wine consumption as share of total alcohol consumption	31.48%	30.73%	0.19	-1.05	0.05	0.11%	67.52%
	Institutional and business environment	Cost of business start-up procedures (% of GNI per capita)	5.19%	4.13%	0.05	2.35	1.54	0.03%	22.93%
		Ease of doing business score	72.606	72.935	8.23	1.54	-0.96	47.358	86.989
		Start-up procedures to register a business (number)	6.436	6.000	2.79	0.15	0.29	1.000	12.750
		Time required to start a business (days)	12.209	9.250	10.74	4.90	2.02	0.500	50.425
		Charges for the use of intellectual property, payments (BOP, current mln US$)	6.509	1.838	10.02	4.75	2.18	0.018	42.847
		Agriculture, forestry, and fishing, value added (% of GDP)	4.62%	3.62%	0.04	1.42	1.30	0.58%	16.42%
	HC and R&D	Employment in agriculture (% of total employment)	10.81%	6.21%	0.11	1.94	1.62	0.09%	43.61%
		Share of graduates teriary education from Agriculture programmes	1.95%	1.83%	0.01	0.50	0.97	0.47%	4.23%
		GERD as % ofGDP	1.36%	1.18%	0.01	-0.53	0.82	0.26%	3.20%
		FTER per million inhabitants	2660.292	2250.786	1836.720	-1.56	0.27	234.352	5510.906
	Knowledge and technology	Wine Patent families per billion ofPPP$ GDP	0.098	0.078	0.09	4.00	1.81	0.005	0.400
		National Wine Tech Share	12.28%	6.36%	0.14	8.10	2.57	0.63%	72.00%
		Patent Intensity	5.08E+07	8.33E+04	2.80E+08	34.93	5.91	174.220	1.66E+09
		Share of international scientific wine related topic articles published	3.08%	1.61%	0.04	2.31	1.84	0.09%	13.69%
		Scientif and technical articles wine topic per billion PPP$ GDP	0.668	0.427	0.68	2.55	1.67	0.047	2.734
Otput	International market performance	Share of world wine export (value)	2.73%	0.35%	0.06	13.49	3.55	0.00%	29.96%
		Share of world wine export (volume)	2.74%	0.43%	0.05	6.18	2.58	0.00%	20.93%
		Share of wine production exported	100.91%	21.91%	3.81	33.74	5.77	0.47%	2272.47%
		Wine export (.000 litres) per million of real GDP	0.747	0.132	1.27	8.28	2.65	0.000	6.044
		Wine export value as share of value of all exports	0.79%	0.11%	0.01	5.02	2.32	0.0002%	5.33%
		Unit value of wine export (current US$/litre)	7.207	3.020	17.05	21.69	4.55	0.791	94.271

wine exports by value in relation to countries' total exports. The index is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets; OECD; World Bank).

– *Unit value of wine exports (current US cents/liter)*: This index quantifies the unit value of exports expressed in US cents/liter. The index is obtained by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets; World Bank; the European Commission's Agriculture and rural development Wine Market Observatory).

3.2. Data processing

The sample includes 35 economies, which account for 95.1% of world wine production and 84.6% of the world's vineyard area. Indices were constructed from quantitative data and composite indicators (subindices). All 35 economies are chosen based on sufficient data to be included in the study. Only annual data from 2016 to 2019 are considered for each economy. The robustness of the modeling choices such as those of normalization and arithmetic averages follow the approach provide by the Joint Research Center (JRC) for the validation of the GII 2022 construction [45].

Potentially problematic subindices with outliers that could distort results and unduly distort performance rankings are treated according to the rules described below, as recommended by the JRC-Competence Center on Composite Indicators and Scoreboards (COIN). First rule: selection. Indicators were classified as problematic if they presented an absolute skewness value greater than 2.25 and kurtosis greater than 3.5 [46]. Second rule: treatment. Indicators with between one and three outliers were subjected to winsorization (values with skewness in the indicator distribution were assigned the next higher value, up to the level at which skewness and/or kurtosis had the values specified above). Indicators with three or more outliers and for which skewness or kurtosis did not fall within the ranges specified above were transformed using natural logarithms using following formula:

$$\ln\left[((\max - 1)\,(value - \min))/(\max - \min)) + 1\right]$$

The indicators were then normalized using the min–max method to the range [0, 100], with higher scores representing better results.

The indices were obtained from the weighted arithmetic mean of the value of the normalized subindices that compose the index itself. With the goal of obtaining index scores that were balanced in their underlying components (i.e., that the subindices could explain a similar amount of variance), we constructed them using a weighted arithmetic mean with predefined weights for the subindices. Becker et al. (2017) and Paruolo et al. (2013) [47,48] demonstrated that the ratio of two nominal weights in weighted arithmetic averages provides the rate of substitutability between two indicators and can be used to reveal the relative significance of individual indicators. This significance can then be compared with ex-post measures of variables' importance such as the nonlinear Pearson correlation ratio [5]. As a result of this analysis, all indicators were assigned a weight of 1 and only two indicators (agriculture, forestry, and fishing, value added as % of GDP and patent intensity) were assigned a weight of 0.5.

Finally, the analysis includes a measure of the distance to the efficiency frontier of innovation using DEA. We chose the output-oriented CCR model, which imposes three restrictions on frontier technology, including constant returns to scale, convexity of the set of feasible input–output combinations, and strong availability of inputs and outputs [43]. The CCR model reformulates the calculation of individual input efficiency measures by solving a linear programming problem for each national innovation system. This efficient frontier is computed as a convex shell in the input space that is represented by a convex set of facets.

Comparing multidimensional innovation performance by subjecting all economies to a fixed, common set of weights may prevent acceptance of an innovation score on the grounds that a particular weighting scheme may not be fair to a particular economy. An interesting feature of the DEA literature applied to real-world decision making contexts is the determination of endogenous weights that maximize the overall score of each DMU given a set of other observations [45]. In this segment, we again relax the assumption of fixed index weights that are common to all economies, and determine the economy-specific weights that maximize an economy's overall innovation score endogenously using DEA. In theory, each economy is free to decide the relative contribution of each area of innovation to its score to obtain the best possible score in a calculation that reflects its innovation strategy. In practice, the DEA method assigns a higher (lower) contribution to areas in which an economy is relatively strong (weak). Reasonable constraints are applied to the weights to prevent an economy from achieving a perfect score. The study then measures DEA efficiency score as the weighted average of all five indices, where the weights are the economy-specific DEA weights, compared with the best performance among all other economies with the same weights. The DEA efficiency score (1 = efficient) repre-

sents the study's measure of the distance from the efficiency frontier.

Finally, we construct an index of revealed comparative advantage in the wine industry (RCAW) that quantifies the proportion of wine exports to the value of exports of other commodities as a benchmark for the sample countries' performance. We then calculate the index by averaging individual annual values from 2016 to 2019 (OIV, Annual Database of global wine markets; World Bank; Wine Market Observatory) using the following formula:

$$RCAW = (X_{ij}/X_{it})/(X_{nj}/X_{nt})$$

where X represents exports, i is a country, j is wine export value, t is a set of value export commodities, and n is a set of countries that are used as reference export markets for comparison. We then analyze the relationship between the efficiency score and the RCAW index on a logarithmic scale.

4. RESULTS AND DISCUSSION

4.1. Performance scores

The index scores allow for an initial classification of countries in relation to the scope described by the index in question [5]. Table 2 presents the top four nations for each of the study's five indices.

The production structure reveals that old world countries lead, with France, Italy, Spain, and Portugal in the top four positions. France, Italy, and Spain also hold top export positions, where Chile emerges in fourth place. New market countries appear to have an advantage over historical producers in relation to the institutional and business environment, human capital, and R&D investments. In contrast, patent production and scientific knowledge again reveals historical countries leading, with Portugal as the top performer.

Table 3 presents the values and corresponding rankings of countries for the production structure index and the values of the subindices used.

As historic producers, Italy, France, and Spain achieve the highest scores and occupy the top three positions [49]. Performance scores in the production structure are high for Eastern European countries such as Moldova, Georgia, and Romania thanks to subindices corrected for the country's economic strength (vine area per million real GDP; wine production (1,000 liters) per million real GDP), in line with the investments made in these countries to develop wine production potential [50].

Table 2. Top four performers for each index.

	Index		Nation rank	Index score
Input	Production structure	1	Italy	73.53
		2	France	67.27
		3	Spain	64.96
		4	Portugal	53.39
	Institutional and business environment	1	New Zealand	78.19
		2	Canada	69.98
		3	United States	64.82
		4	Australia	64.45
	HC and R&D	1	Austria	58.77
		2	Germany	56.76
		3	Switzerland	56.40
		4	Bel-Lux	55.49
	Knowledge and technology	1	Portugal	72.43
		2	Spain	57.42
		3	Georgia	53.20
		4	Italy	50.42
Output	International market performance	1	France	57.76
		2	Italy	57.33
		3	Spain	51.50
		4	Chile	48.43

Table 4 presents the performance values and resulting ranking of countries for the institutional and business environment index and the subindices used in its construction.

New Zealand emerges as the country with the best institutional and economic conditions for making innovations marketable. In general, the United Kingdom and former British colonies achieve the best performance, with Canada, the United States, and Australia occupying the second through fourth positions, respectively. Among old world producers, only France performs close to the best (seventh), while Spain and Portugal are further behind, respectively ranking fourteenth and sixteenth. Italy is only ranked twenty-ninth, with one of the highest values in the cost of innovative startups relative to GNI per capita (14.08%) and the number of procedures required to register a new business (seventh), highlighting a bureaucratic machine that, as widely acknowledged, is a hindrance to innovative activities [51]. The institutional and business environment has an important influence on increasing wineries' economic performance, and these aspects should not be neglected in pursuit of balancing national innovation strategies [52].

Table 5 presents the values and corresponding rankings of countries for the human capital and research index.

Table 3. Production structure index scores and ranking.

	Nations rank	Share of world vine area	Vine area as share of total crop	Vine area (ha) per million real GDP	Share of world wine production (volume)	Wine prod (.000 litres) per million real GDP	Wine self-sufficiency	Share of world wine consumption (volume)	Wine consumption as share of total alcohol consumption	Production structure index
1	Italy	9.22%	7.44%	0.61	16.50%	4.32	216.57%	9.16%	67.52%	73.53
2	France	10.54%	4.05%	0.53	16.20%	3.09	159.20%	10.99%	56.44%	67.27
3	Spain	12.57%	5.53%	1.25	14.17%	5.16	552.86%	2.85%	22.28%	64.96
4	Portugal	2.38%	10.25%	1.26	2.39%	4.64	125.04%	2.12%	65.51%	53.39
5	Moldova	1.95%	7.37%	6.86	0.67%	7.83	154.17%	0.49%	55.09%	52.14
6	Georgia	0.69%	11.02%	1.55	0.51%	3.41	164.75%	0.34%	47.32%	45.18
7	Chile	1.91%	8.27%	0.47	4.16%	3.74	513.66%	0.92%	29.91%	44.71
8	Argentina	2.96%	0.55%	0.47	4.57%	2.41	137.06%	4.00%	54.15%	38.69
9	United States	5.68%	0.26%	0.04	9.77%	0.29	73.31%	13.22%	16.95%	37.57
10	Romania	2.34%	1.95%	1.74	1.55%	3.36	110.97%	1.68%	31.02%	34.85
11	New Zealand	0.50%	5.67%	0.37	1.13%	2.80	268.18%	0.45%	36.05%	34.26
12	South Africa	1.66%	2.34%	0.39	3.80%	3.51	227.13%	1.79%	23.90%	33.87
13	Greece	1.41%	3.26%	0.82	0.88%	1.90	101.28%	1.01%	49.59%	32.93
14	Australia	1.78%	0.55%	0.19	4.92 %	1.80	234.82%	2.31%	33.82%	31.01
15	Hungary	0.89%	1.51%	0.79	1.10%	3.15	141.66%	0.92%	30.01%	29.79
16	China	11.58%	0.64%	0.05	2.97%	0.07	49.23%	6.72%	3.94%	28.79
17	Germany	1.38%	0.86%	0.06	3.27%	0.49	44.86%	8.07%	29.27%	25.59
18	Austria	0.63%	3.33%	0.21	0.91%	0.97	105.42%	1.01%	35.51%	25.07
19	Bulgaria	0.87%	1.77%	0.94	0.41%	1.91	174.58%	0.31%	13.96%	24.96
20	Croatia	0.32%	2.59%	0.61	0.16%	1.11	22.97%	0.75%	51.12%	24.58
21	Uruguay	0.09%	0.28%	0.15	0.27%	1.54	115.09%	0.27%	54.22%	23.73
22	Algeria	0.90%	0.83%	0.42	0.20%	0.32	84.31%	0.25%	43.84%	22.49
23	Turkey	5.93%	1.88%	0.50	0.17%	0.05	103.84%	0.17%	7.01%	22.38
24	Morocco	0.62%	0.50%	0.27	0.14%	0.22	87.81%	0.16%	49.74%	21.78
25	Switzerland	0.20%	3.52%	0.07	0.37%	0.45	34.28%	1.14%	50.14%	21.51
26	Tunisia	0.29%	0.44%	0.28	0.08%	0.28	106.95%	0.08%	19.87%	16.44
27	Russia	0.87%	0.05%	0.05	1.75%	0.40	46.17%	3.84%	11.74%	15.31
28	Ukraine	0.57%	0.13%	0.23	0.40%	0.57	43.48%	0.94%	11.95%	13.58
29	Brazil	1.04%	0.12%	0.05	1.03%	0.13	96.44%	1.37%	4.20%	12.77
30	UK	0.03%	0.04%	0.00	0.02%	0.00	0.56%	5.30%	32.39%	10.99
31	Canada	0.19%	0.02%	0.01	0.21%	0.06	11.11%	2.02%	25.97%	9.62
32	India	1.91%	0.08%	0.02	0.08%	0.00	86.89%	0.10%	0.11%	9.59
33	Bel-Lux	0.02%	0.16%	0.00	0.06%	0.05	5.39%	1.18%	30.73%	8.32
34	Mexico	0.45%	0.12%	0.03	0.15%	0.04	34.52%	0.45%	2.77%	6.79
35	Japan	0.23%	0.38%	0.01	0.06%	0.01	5.80%	1.18%	3.88%	3.84

Central Europe emerges as a cluster of excellence, with Austria, Germany, Switzerland, and Bel-Lux occupying the top four positions. Among the *old world* countries, France and Portugal, ranked tenth and eleventh, respectively as the highest scores, while Italy ranked twentieth, with the subindex of full-time equivalent researchers per million inhabitants weighing more negatively compared to the reference countries. These human capital indicators, which have a crucial role in the wine industry's competitiveness, are often absent or poorly expressed [53]. National employment, funding for research, and training in agriculture appear to be the best proxies in a cross-country comparison [5].

Table 6 presents the scores and ranking of countries for the knowledge and technology index.

The highest performance is achieved by Portugal, followed by Spain in second place. These two countries lead in different ways. Portugal, Georgia, Croatia, Roma-

Table 4. Institutional and business environment index scores and ranking.

	Nations rank	Cost of business startup procedures (% of GNI per capİta)	Ease of doing business score	Start-up procedures to register a busİness (number)	Time required to start a busİness (days)	Charges for the use of intellectual property, payments (BOP, current mln US$)	Agriculture value added (% of GDP)	Institutional and business environment index
1	New Zealand	0.25%	86.99	1.00	0.50	0.91	5.70%	78.19
2	Canada	0.35%	79.54	2.00	1.50	12.30	1.82%	69.98
3	United States	0.03%	83.41	4.00	4.50	13.69	0.91%	64.82
4	Australia	0.70%	80.73	3.00	2.38	3.48	2.42%	64.45
5	United Kingdom	1.05%	83.69	6.00	5.25	42.85	0.58%	63.69
6	Georgia	2.35%	82.76	1.50	1.75	0.03	6.70%	62.19
7	France	0.70%	76.46	5.00	3.63	14.34	1.54%	61.42
8	Russia	1.10%	76.84	4.00	10.10	6.03	3.58%	59.55
9	China	1.35%	69.65	7.00	17.75	30.72	7.43%	59.02
10	Switzerland	2.30%	76.57	6.00	10.00	25.09	0.65%	56.55
11	Ukraine	0.70%	68.20	6.00	6.50	0.50	10.25%	55.15
12	Moldova	5.20%	73.19	3.75	4.75	0.03	10.83%	54.08
13	Morocco	5.80%	70.88	4.25	9.25	0.14	10.91%	52.08
14	SpaİN	4.08%	77.72	7.00	12.75	5.88	2.71%	51.87
15	Bel-Lux	5.33%	73.58	5.00	4.63	3.35	0.64%	51.23
16	Portugal	2.03%	76.52	6.00	6.38	0.87	2.07%	50.50
17	Japan	7.50%	78.00	8.00	11.20	22.60	1.08%	50.39
18	Germany	6.63%	79.49	9.00	8.00	14.67	0.75%	49.65
19	Romania	0.78%	72.93	6.00	19.75	0.91	4.43%	49.35
20	Hungary	5.48%	72.68	6.00	7.00	1.59	3.62%	49.29
21	Chile	5.05%	72.11	7.25	6.25	1.84	4.10%	48.79
22	Greece	1.75%	67.51	4.00	10.50	0.32	3.70%	47.72
23	India	12.65%	63.85	11.50	23.08	6.94	16.42%	46.66
24	Austria	4.95%	78.76	8.00	21.00	1.77	1.13%	44.00
25	South Africa	0.20%	66.11	7.00	42.50	1.65	2.28%	42.68
26	Turkey	13.58%	73.08	8.50	8.50	1.99	6.09%	42.65
27	Bulgaria	1.15%	71.77	7.00	23.00	0.21	3.68%	42.57
28	Tunisia	4.13%	66.68	8.00	11.00	0.02	9.29%	41.87
29	İtaly	14.08%	72.73	7.00	11.00	4.89	1.94%	41.58
30	Croatia	6.85%	72.83	7.75	21.75	0.30	2.94%	37.98
31	Brazil	4.73%	57.13	11.00	50.43	5.23	4.53%	34.91
32	MexİCo	16.55%	72.39	8.00	8.40	0.32	3.38%	33.57
33	Argentina	7.88%	57.92	12.75	17.88	2.05	5.34%	31.63
34	Uruguay	22.93%	61.16	5.00	6.50	0.13	6.08%	30.28
35	Algerİa	11.68%	47.36	12.00	18.00	0.14	12.05%	26.30

nia, and Moldova obtain highest score in subindices that measure the importance of patent activity and academic research in relation to GDP weight (patent families per billion PPP$ GDP, national wine tech share, and scientific and technical articles on a wine topic per billion PPP$ GDP). In contrast, Spain, Italy, the United States, China, and France excel in international scientific production (percentage of international scientific wine topic articles published) and in the patent intensity subindex, which describes the propensity to patent regardless of the value of the wine market.

Table 7 presents the scores and rankings for the International market performance index and the values of subindices used.

Table 5. Human capital and research index scores and ranking.

	Nations rank	Employment in agriculture (% of total employment)	Share of graduates tertiary education from Agriculture programmes	GERD as % of GDP	FTER per million inhabitants	HC and R&D index
1	Austria	3.91%	1.57%	3.11%	5510,91	58.77
2	Germany	1.26%	1.85%	3.06%	5114.83	56.76
3	Switzerland	3.02%	1.45%	3.07%	5353.24	56.40
4	Bel-Lux	1.08%	1.99%	2.85%	5038.07	55.49
5	Japan	3.45%	1.00%	3.20%	5307.83	54.51
6	New Zealand	6.18%	2.28%	1.33%	5458.61	49.37
7	Hungary	4.91%	3.52%	1.40%	3407.61	47.86
8	United States	1.10%	0.94%	3.02%	4500.56	47.43
9	China	26.52%	2.00%	2.18%	1322.59	46.83
10	France	2.62%	1.57%	2.23%	4626.35	46.36
11	Portugal	6.21%	2.10%	1.37%	4478.12	43.92
12	Greece	12.08%	2.54%	1.18%	3427.57	43.68
13	Romania	22.36%	4.06%	0.49%	901.74	41.78
14	Croatia	6.75%	3.86%	0.97%	1916.57	40.39
15	Canada	1.53%	1.47%	1.68%	4457.95	39.61
16	Ukraine	14.81%	4.23%	0.48%	958.70	38.74
17	Morocco	34.60%	1.99%	0.71%	1073.54	37.75
18	Australia	2.60%	0.71%	1.88%	4550.00	37.28
19	United Kingdom	1.40%	0.95%	1.67%	4470.13	36.03
20	İtaly	3.83%	2.41%	1.42%	2405.95	35.15
21	Georgia	41.00%	1.21%	0.29%	1461.59	34.46
22	Turkey	18.86%	2.20%	0.99%	1463.13	34.33
23	Brazil	9.49%	2.72%	1.23%	887.70	31.71
24	India	43.61%	0.87%	0.67%	234.35	31.16
25	Russia	6.08%	1.53%	1.07%	2854.09	29.85
26	Uruguay	8.43%	3.60%	0.41%	703.90	29.11
27	Spain	4.20%	1.16%	1.25%	2897.54	28.04
28	Bulgaria	6.74%	1.83%	0.82%	2250.79	27.20
29	Tunisia	14.42%	1.40%	0.67%	1826.69	25.44
30	Moldova	27.86%	0.47%	0,.6%	894.05	19.08
31	Algeria	9.98%	1.69%	0.53%	819.34	18.93
32	Mexico	12.88%	1.96%	0.34%	316.11	18.31
33	South Africa	5.32%	1.96%	0.71%	494.01	17.99
34	Chile	9.23%	1.76%	0.36%	494.96	15.96
35	Argentina	0.09%	1.49%	0.54%	1231.11	13.86

The results show the leadership position of historic producers such as France and Italy, which respectively fall into first and second place. Chile appears to be extremely competitive, with a strong export propensity (85.70% of production destined for export) and a structure that is capable of achieving value (5.63% of the world share of value in wine exports) [49]. The United States, ranked fifteenth, has the worst performance in international markets among countries that hold at least 2% of the world's wine export value share.

4.2. Measure of efficiency

We next conduct an assessment of the distance to the global efficiency frontier by comparing countries on an intercontinental basis. Despite countries operating with different processes, this intercontinental comparison allows a sharper discrimination between intracontinental groups (Table 8) [54].

According to the results, Italy, Chile, and New Zealand are at the frontier of efficiency, defining this frontier as the

Table 6. Knowledge and technology index scores and ranking.

	Nations rank	Wine Patent families/ billion PPP$ GDP	National Wine Tech Share (PCT wine/PCT total)	Patent Intensity (PCT wine/wine exp value as % of real GDP)	Share of international scientific wine topic articles published	Scientif and technical articles Wine topic/billion PPP$ GDP	Knowledge and technology index
1	Portugal	0.40	42.57%	2.34E+04	4.42%	2.73	72.43
2	Spain	0.14	13.20%	7.62E+04	12.88%	1.35	57.42
3	Georgia	0.36	72.00%	5.47E+02	0.12%	1.02	53.20
4	İtaly	0.15	9.01%	8.44E+04	11.58%	0.82	50.42
5	United States	0.13	4.8%	3.58E+07	13.69%	0.10	50.05
6	Croatia	0.10	19.57%	2.32E+04	0.97%	2.35	46.80
7	China	0.07	1.86%	2.52E+07	13.13%	0.14	43.28
8	Romania	0.05	37.11%	9.26E+04	2.08%	1.32	43.09
9	France	0.18	6.36%	1.23E+05	8.03%	0.43	42.86
10	Moldova	0.19	29.81%	1.74E+02	0.17%	2.33	42.78
11	Australia	0.17	12.99%	1.54E+05	5.25%	0.55	42.58
12	Greece	0.09	19.10%	4.58E+04	1.41%	0.98	37.08
13	Japan	0.19	1.90%	1.66E+09	1.67%	0.05	35.88
14	Bulgaria	0.13	16.86%	1.38E+04	0.41%	0.93	35.60
15	Hungary	0.13	13.59%	2.77E+04	0.68%	0.64	33.03
16	Chile	0.09	13.23%	3.36E+03	1.77%	0.91	32.17
17	Uruguay	0.03	19.67%	8.23E+03	0.48%	1.08	30.5
18	Germany	0.10	2.08%	1.30E+06	3.95%	0.15	29.62
19	New Zealand	0.08	6.00%	2.72E+03	1.55%	1.06	28.57
20	United Kingdom	0.08	4.05%	8.53E+05	3.14%	0.16	28.12
21	Brazil	0.01	4.11%	6.51E+06	4.71%	0.35	27.85
22	India	0.04	5.53%	3.01E+07	2.46%	0.13	27.41
23	Switzerland	0.14	2.10%	5.59E+05	0.92%	0.18	26.6
24	South Africa	0.06	8.14%	1.10E+04	1.72%	0.65	26.53
25	Turkey	0.05	2.75%	3.02E+06	1.63%	0.28	24.20
26	Argentina	0.01	18.31%	3.98E+03	1.61%	0.42	24.04
27	Russia	0.03	5.07%	8.94E+06	1.29%	0.12	23.82
28	Ukraine	0.07	5.71%	2.93E+04	0.38%	0.43	23.13
29	Tunisia	0.02	11.43%	1.10E+04	0.19%	0.63	22.94
30	Canada	0.03	1.69%	1.03E+06	2.56%	0.22	21.57
31	Bel-Lux	0.06	2.30%	8.33E+04	0.8%	0.22	20.17
32	Algeria	0.01	10.96%	2.78E+05	0.10%	0.08	19.48
33	Mexico	0.01	2.55%	1.13E+06	1.06%	0.13	17.39
34	Austria	0.02	0.63%	2.02E+04	1.05%	0.35	15.67
35	Morocco	0.01	2.61%	1.17E+04	0.09%	0.10	12.24

best performance achieved. The ratio between the radial distance from the origin and the length of the segment that joins the origin to the efficiency frontier, passing through the coordinates of another country, provides other countries' efficiency [55]. Some economies are highly efficient in converting inputs into output, while others, although not reaching the efficiency frontier, are able to achieve good performance in relation to the RCAW index (Fig. 1).

First, a positive relationship emerges between innovation system efficiency and the opportunity cost in wine production described by the index. Furthermore, it is possible to define those systems above the polynomial trend of the relationship as countries that are capable of performing above their potential, even if they may not have full efficiency in the DEA score. This is the case for France, Spain, Argentina, Australia, and South Africa. United Kingdom and Bel-Lux also exhibit positive efficiency performance, with a negative comparative advantage but excellent innovation performance, which is linked to the phenomena of re-export and innovations

Table 7. International market performance index scores and ranking.

Nations rank	Share of world wine export (value)	Share of world wine export (volume)	Share of wine production exported	Wine export (.000 litres) per million of real GDP	Wine export value as share of value of all exports	Unit value of wine export (current US$/1itre)	International market performance index
1 France	29.96%	13.69%	34.30%	0.97	1.84%	7.19	57.76
2 Italy	19.79%	19.55%	48.94%	1.85	1.33%	3.32	57.33
3 Spain	9.12%	20.93%	60.11%	3.27	1.04%	1.44	51.50
4 Chile	5.63%	8.49%	85.70%	2.98	2.97%	2.15	48.43
5 New Zealand	3.45%	2.34%	83.17%	2.18	3.21%	4.85	43.04
6 Moldova	0.35%	1.35%	81.35%	4.01	5.18%	0.86	42.62
7 Georgia	0.52%	0.54%	44.13%	1.05	5.33%	3.14	40.61
8 Australia	5.68%	7.41%	60.52%	1.08	0.86%	2.52	37.35
9 Portugal	2.54%	2.75%	46.44%	1.99	1.46%	3.02	34.27
10 United Kingdom	2.12%	1.03%	2272.47%	0.06	0.15%	6.72	32.08
11 South Africa	2.05%	4.24%	44.66%	1.37	0.84%	1.60	29.90
12 Argentina	2.35%	2.43%	21.70%	0.56	1.41%	3.19	27.35
13 Germany	3.22%	3.58%	41.64%	0.21	0.08%	2.96	24.13
14 Bel-Lux	0.53%	0.38%	261.94%	0.13	0.04%	4.54	23.46
15 United States	4.29%	3.63%	14.98%	0.04	0.10%	3.87	20.50
16 Hungary	0.30%	0.63%	21.91%	0.73	0.40%	1.52	19.19
17 Austria	0.55%	0.50%	22.10%	0.22	0.11%	3.63	17.86
18 Switzerland	0.35%	0.01%	1.33%	0.01	0.04%	9.42	17.58
19 China	1.63%	0.09%	1.18%	0.00	0.02%	4.76	16.94
20 Greece	0.25%	0.27%	11.96%	0.22	0.27%	2.98	15.87
21 Bulgaria	0.10%	0.43%	39.72%	0.51	0.14%	0.88	14.60
22 Croatia	0.04%	0.04%	10.22%	0.11	0.37%	3.41	14.00
23 Canada	0.20%	0.62%	121.16%	0.07	0.02%	1.02	13.92
24 Japan	0.01%	0.002%	1.34%	0.0001	0.0002%	12.40	11.87
25 Uruguay	0.05%	0.09%	12.71%	0.06	0.12%	2.17	11.36
26 India	0.02%	0.01%	6.12%	0.0002	0.002%	6.45	11.29
27 Tunisia	0.01%	0.01%	5.68%	0.01	0.03%	4.68	10.84
28 Ukraine	0.10%	0.40%	40.56%	0.25	0.08%	0.79	10.74
29 Romania	0.08%	0.15%	3.73%	0.13	0.04%	1.83	10.52
30 Mexico	0.02%	0.01%	2.76%	0.001	0.002%	5.78	10.28
31 Morocco	0.03%	0.05%	15.28%	0.05	0.05%	1.50	9.63
32 Turkey	0.03%	0.04%	9.39%	0.005	0.007%	2.38	9.13
33 Brazil	0.02%	0.02%	0.98%	0.001	0.003%	3.49	8.38
34 Algeria	0.00%	0.002%	0.47%	0.001	0.002%	2.51	7.13
35 Russia	0.02%	0.05%	1.19%	0.005	0.003%	1.56	5.76

related to distribution channels. Countries below the trend line, such as Portugal and Georgia, indicate the presence of untapped potential, with high comparative advantage and improvable efficiency scores.

Table 9 presents the efficiency scores for economies that perform under expectations that have a positive RCAW index, along with corresponding input slack. The slack values represent the quantities of input that are not fully used, indicating unused potential. Specifically, input slack values represent the quantities that could be reduced while still achieving the same results.

The results reveal that the human capital and research and knowledge and technology indices are correlated with making such systems inefficient. These findings indicate how these innovation systems generally fall short in making innovations effective and profitable, regardless of individual country cases. Human capital and innovative production are the least fully exploited factors, highlighting the complex issue of the connection between innovative production and profit effects.

Table 8. Top five efficient systems by region.

Region	Nation	Efficiency frontier score (DEA)
Central Europe	Italy	1
	United Kingdom	1.056
	Bel-Lux	1.078
East Europe	Moldova	1.143
	Georgia	1.329
	Hungary	2.023
North and South America	Chile	1
	Argentina	1.243
	Canada	1.809
Africa	South Africa	1.301
	Tunisia	2.468
	Morocco	2.522
Asia and Oceania	New Zealand	1
	Japan	1.014
	Australia	1.219

Recent new world history reveals that production expansion is not the only way to achieve export growth. For example, export growth in Chile and South Africa was possible without large initial production expansion [50]. This is attributable to a shift from low-quality wine intended for domestic consumers to high-quality wine that was primarily intended for export, with innovative approaches and investment in R&D. Such innovative production was one of the pivotal aspects of growth, and slacks in the innovation system regarding the knowledge and technology index should be considered spare capacity that is ready to be used. In this sense, nations such as Portugal (26.485) and Georgia (18.331) can be considered the systems with the highest potential if they are able to exploit and make such innovative productions marketable.

5. CONCLUSION

The study investigates the relationship between innovation and export performance to explore the role

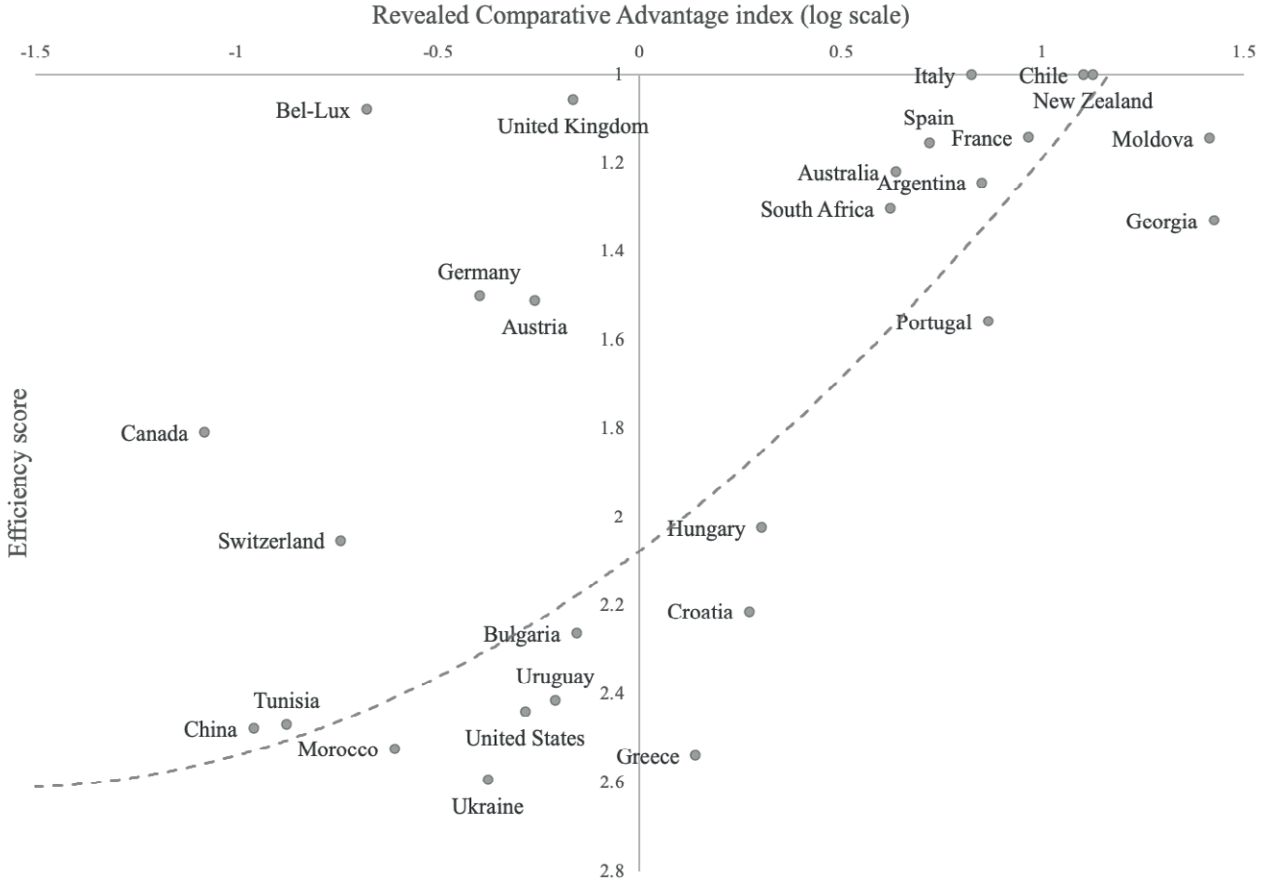


Figure 1. Relationship between efficiency score and the revealed comparative advantage in the wine industry index.

Table 9. Efficiency score and relative input slack for economies performing below expectations.

DMU	Efficiency frontier score (DEA)	Efficiency frontier rank (DEA)	slack_input Production structure	slack_input Institutional and business environment	slack_input HC and R&D	slack_input Knowledge and technology
Moldova	1.143	8	0.000	1.992	10.633	0.000
Georgia	1.329	13	0.000	0.000	10.323	18.331
Portugal	1.557	16	0.000	0.000	23.069	26.485
Hungary	2.023	19	0.000	0.000	26.805	5.829
Croatia	2.213	22	0.000	0.000	24.687	13.717
Greece	2.538	29	0.000	0.000	24.608	7.986

of national innovation systems in the nexus between innovation and performance. We develop a model that diverges from a sole assessment of R&D impact on performance and encapsulates the multifaceted nature of the innovation process and environment within a national system, categorizing multiple variables into production inputs, regulatory environment, human capital, types of innovation, and market performance. This approach theoretically tracks the process by which innovation outcomes influence firms' performance in international markets. The analysis reveals that historical producers have sustained their leading positions in the market by building efficient, diversified innovative systems that are capable of meeting the challenges of the international market. In contrast, less efficient countries exhibit significant potential that can be realized through targeted investments and policies to connect innovation to export demand and enhancing knowledge transfer practices.

The efficiency analysis could assist countries in improving their policy mix. It might be more effective to focus on policies to augment investments in production, regulatory, and human capital components for nations demonstrating high efficiency that aim to enhance overall performance in the international market. Moreover, given their high efficiency levels, these countries might find it challenging to boost performance without increasing innovation-related input. Examples of such countries include Italy and New Zealand, which had elevated performance in production and administrative system dimensions. Consequently, it is crucial for these nations to ensure that the escalation in innovation-related input does not result in reduced system efficiency, which requires policies tailored to enhancing the capacity to absorb incremental innovative inputs.

For countries exhibiting lower efficiency, it may be more effective to concentrate on implementing policies to enhance efficiency in converting inputs into outputs. Relevant policies can support businesses' innovation processes (such as innovation support services) and stimulate the demand for innovation. By enhancing efficiency, countries' outcomes can improve without necessarily requiring increased input investments. Moreover, if low efficiency countries solely invest in augmenting innovation inputs without adopting policies to enhance efficiency, the impact in terms of increased outcomes are at risk of being limited.

The development of a national innovation system should support the creation and demand for knowledge and expedient dissemination and absorption into entrepreneurial activities, particularly for systems with untapped potential and inefficiency. In contrast, enterprises operating within more efficient national systems will be motivated to innovate when innovation is perceived as a significant business opportunity. Related policies should aid in identifying innovative business opportunities and effectively channel support capital into the innovation process to render the innovation process self-sustaining.

In terms of methodology, our study approach incorporates a new measure of innovation efficiency that is connected to the market. The primary limitations concern the availability and quality of data, although the methodological choices are focused on decreasing any bias caused by missing data. Moreover, the relationship with wine export performance for some of the indicators used must be further investigated in future research to increase the robustness of the proposed approach. Future studies could replicate this research in other areas to validate the model in different contexts to allow cross-sector comparisons.

REFERENCES

[1] H.-D. Haustein, H. Maier, and L. Uhlmann, "Innovation and efficiency," 1981.

[2] F. Gault, "Defining and measuring innovation in all sectors of the economy," Research Policy, vol. 47, no. 3, pp. 617–622, Apr. 2018, doi: 10.1016/j.respol.2018.01.007.

[3] A. Arundel, S. Athreye, and S. Wunsch-Vincent, Eds., Harnessing public research for innovation in the 21st century: an international assessment of knowledge transfer policies. in Intellectual property, innovation and economic development. Cambridge, United Kingdom; New York, NY: Cambridge University Press, 2021.

[4] J. L. Hervas-Oliver, M. D. Parrilli, A. Rodríguez-Pose, and F. Sempere Ripoll, "The drivers of SME innovation in the regions of the EU," Research Policy, vol. 50, p. 104316, Nov. 2021, doi: 10.1016/j.respol.2021.104316.

[5] S. Dutta, B. Lanvin, S. Wunsch-Vincent, L. R. León, and World Intellectual Property Organization, Global innovation index 2022: (subtitle) /. Unknown. doi: 10.34667/TIND.46596.

[6] L. Correia, S. Gouveia, and P. Martins, "The European Wine Export Cycle," Wine Economics and Policy, vol. 8, May 2019, doi: 10.1016/j.wep.2019.04.001.

[7] G. Maesano, G. Di Vita, G. Chinnici, P. Gioacchino, and M. D'Amico, "What's in organic wine consumer mind? A review on purchasing drivers of organic wines," WEP, vol. 10, no. 1, pp. 3–21, Mar. 2021, doi: 10.36253/wep-9101.

[8] M. Bell and E. Giuliani, "Catching up in the global wine industry: innovation systems, cluster knowledge networks and firm-level capabilities in Italy and Chile," International Journal of Technology and Globalisation, vol. 3, no. 2–3, pp. 197–223, 2007.

[9] G. Banks and J. Overton, "Old world, new world, third world? Reconceptualising the worlds of wine," Journal of Wine Research, vol. 21, no. 1, pp. 57–75, 2010.

[10] R. Kaplinsky, How can agricultural commodity producers appropriate a greater share of value chain incomes? Cheltenham: Edward Elgar and FAO, 2006.

[11] R. Kaplinsky and R. Fitter, "Technology and globalisation: who gains when commodities are decommodified?," International Journal of Technology and Globalisation, vol. 1, no. 1, pp. 5–28, 2004.

[12] J. R. F. Lorenzo, M. T. M. Rubio, and S. A. Garcés, "The competitive advantage in business, capabilities and strategy. What general performance factors are found in the Spanish wine industry?" Wine Economics and Policy, vol. 7, no. 2, pp. 94–108, 2018.

[13] A. Gilinsky Jr, S. L. Forbes, and M. M. Reed, "Writing cases to advance wine business research and pedagogy: A Business Article by," Wine Economics and Policy, vol. 5, no. 1, pp. 60–67, 2016.

[14] C. Van Leeuwen and G. Seguin, "The concept of terroir in viticulture," Journal of wine research, vol. 17, no. 1, pp. 1–10, 2006.

[15] E. Vaudour, "The quality of grapes and wine in relation to geography: Notions of terroir at various scales," Journal of Wine Research, vol. 13, no. 2, pp. 117–141, 2002.

[16] D. Vrontis, S. Bresciani, and E. Giacosa, "Tradition and innovation in Italian wine family businesses," British Food Journal, 2016.

[17] B. Tyler et al., "SME managers' perceptions of competitive pressure and the adoption of environmental practices in fragmented industries: A multi-country study in the wine industry," Organization & Environment, vol. 33, no. 3, pp. 437–463, 2020.

[18] P. Woodfield and K. Husted, "Intergenerational knowledge sharing in family firms: Case-based evidence from the New Zealand wine industry," Journal of Family Business Strategy, vol. 8, no. 1, pp. 57–69, 2017.

[19] A. Dogru and J. Peyrefitte, "Investigation of Innovation in Wine Industry via Meta-Analysis," Wine Business Journal, vol. 5, no. 1, Jan. 2022, doi: 10.26813/001c.31627.

[20] OECD and Eurostat, Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition. in The Measurement of Scientific, Technological and Innovation Activities. OECD, 2018. doi: 10.1787/9789264304604-en.

[21] A. Palangkaraya, "The link between innovation and export performance of Australian SMEs," in The Effects of Globalisation on Firm and Labour Performance, Routledge, 2020, pp. 10–33.

[22] J. B. Barney, "Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view," Journal of management, vol. 27, no. 6, pp. 643–650, 2001.

[23] W. M. Cohen and D. A. Levinthal, "Absorptive capacity: A new perspective on learning and innovation," Administrative science quarterly, pp. 128–152, 1990.

[24] J. Galbreath, "Which resources matter the most to firm success? An exploratory study of resource-based theory," Technovation, vol. 25, no. 9, pp. 979–987, 2005.

[25] M. Easterby-Smith and I. M. Prieto, "Dynamic capabilities and knowledge management: an inte-

grative role for learning?" British journal of management, vol. 19, no. 3, pp. 235–249, 2008.
[26] R. M. Grant, "Knowledge-Based View," Wiley encyclopedia of management, pp. 1–2, 2015.
[27] A. Cherubini Alves, A. Carneiro Zen, and A. Domingus Padula, "Routines, capabilities and innovation in the Brazilian wine industry," Journal of technology management & innovation, vol. 6, no. 2, pp. 128–144, 2011.
[28] F. Chirico and M. Nordqvist, "Dynamic capabilities and trans-generational value creation in family firms: The role of organizational culture," International Small Business Journal, vol. 28, no. 5, pp. 487–504, 2010.
[29] D. J. Teece, G. Pisano, and A. Shuen, "Dynamic capabilities and strategic management," Strategic management journal, vol. 18, no. 7, pp. 509–533, 1997.
[30] E. M. Rogers, Diffusion of innovations. Simon and Schuster, 2010.
[31] R. R. Nelson and S. G. Winter, An evolutionary theory of economic change, Digitally reprinted. Cambridge, Mass.: The Belknap Press of Harvard Univ. Press, 2004.
[32] G. Dosi, C. Freeman, R. Nelson, G. Silverberg, and L. Soete, Eds., Technical Change and Economic Theory. Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies, Pisa, Italy, 1988. [Online]. Available: https://EconPapers.repec.org/RePEc:ssa:lembks:dosietal-1988
[33] S. J. Kline and N. Rosenberg, "An overview of innovation," Studies on science and the innovation process: Selected works of Nathan Rosenberg, pp. 173–203, 2010.
[34] C. Freeman, "The economics of technical change," Cambridge Journal of Economics, vol. 18, no. 5, pp. 463–514, Oct. 1994, doi: 10.1093/oxfordjournals.cje.a035286.
[35] B.-Å. Lundvall, "National Innovation Systems—Analytical Concept and Development Tool," Industry & Innovation, vol. 14, pp. 95–119, Feb. 2007, doi: 10.1080/13662710601130863.
[36] R. R. Nelson, National innovation systems: a comparative analysis. Oxford University Press on Demand, 1993.
[37] OECD, Measuring Innovation: A New Perspective. OECD, 2010. doi: 10.1787/9789264059474-en.
[38] S. M. Valitov and A. K. Khakimov, "Innovative potential as a framework of innovative strategy for enterprise development," Procedia Economics and Finance, vol. 24, pp. 716–721, 2015.
[39] K. Janoskova and P. Kral, "Innovation measurement: An extensive literature analysis," presented at the SHS Web of Conferences, EDP Sciences, 2021, p. 05003.
[40] OECD, Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development. in The Measurement of Scientific and Technological Activities. OECD, 2002. doi: 10.1787/9789264199040-en.
[41] K. Smith, "Measuring innovation," 2006.
[42] S. M. Vasin and L. A. Gamidullaeva, "Methodical approach and tools to improve the efficiency of managing of the innovation potential in the context of economic globalization," Rev. Eur. Stud., vol. 7, p. 124, 2015.
[43] L. R. Murillo-Zamorano, "Economic efficiency and frontier techniques," Journal of Economic surveys, vol. 18, no. 1, pp. 33–77, 2004.
[44] A. Bonaccorsi and C. Daraio, "Econometric approaches to the analysis of productivity of R&D systems: production functions and production frontiers," Handbook of quantitative science and technology research: The use of publication and patent statistics in studies of S&T systems, pp. 51–74, 2005.
[45] M. Saisana, G. Caperna, C. Moura, A. R. Neves, and E. Papadimitriou, "JRC Statistical Audit of the Competitive Sustainability Index 2022," 2022.
[46] R. A. Groeneveld and G. Meeden, "Measuring Skewness and Kurtosis," The Statistician, vol. 33, no. 4, p. 391, Dec. 1984, doi: 10.2307/2987742.
[47] W. Becker, M. Saisana, P. Paruolo, and I. Vandecasteele, "Weights and importance in composite indicators: Closing the gap," Ecological Indicators, vol. 80, pp. 12–22, Sep. 2017, doi: 10.1016/j.ecolind.2017.03.056.
[48] P. Paruolo, M. Saisana, and A. Saltelli, "Ratings and rankings: voodoo or science?" Journal of the Royal Statistical Society: Series A (Statistics in Society), vol. 176, no. 3, pp. 609–634, 2013.
[49] E. Pomarici, A. Corsi, S. Mazzarino, and R. Sardone, "The Italian wine sector: Evolution, structure, competitiveness and future challenges of an enduring leader," Italian Economic Journal, vol. 7, no. 2, pp. 259–295, 2021.
[50] K. Anderson, "Is Georgia the next 'new' wine-exporting country?" Journal of Wine Economics, vol. 8, no. 1, pp. 1–28, 2013.
[51] R. Spadoni, M. Nanetti, A. Bondanese, and S. Rivaroli, "Innovative solutions for the wine sector: The role of startups," Wine Economics and Policy, vol. 8, no. 2, pp. 165–170, 2019.

[52] M. Raimondo, C. Nazzaro, A. Nifo, and G. Marotta, "Does the Institutional Quality Affect Labor Productivity in Italian Vineyard Farms?" Wine Economics and Policy, vol. 9, no. 2, pp. 113–126, 2020.
[53] J. Mota, R. Costa, A. Moreira, S. Serrão, and C. Costa, "Competitiveness framework to support regional-level decision-making in the wine industry: a systematic literature review," Wine Economics and Policy, vol. 10, no. 2, pp. 29–40, 2021.
[54] M. Varas, F. Basso, S. Maturana, R. Pezoa, and M. Weyler, "Measuring efficiency in the Chilean wine industry: a robust DEA approach," Applied Economics, vol. 53, no. 9, pp. 1092–1111, 2021.
[55] S. Rousseau and R. Rousseau, "Data envelopment analysis as a tool for constructing scientometric indicators," Scientometrics, vol. 40, no. 1, pp. 45–56, 1997.

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

Citation: Yanes-Estévez, V., & García-Pérez, A.M. (2024). Opportunities and threats for agrifood firms. The case of wineries applying Rasch analysis. *Wine Economics and Policy* 13(1): 81-96. doi: 10.36253/wep-15280

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Opportunities and threats for agrifood firms. The case of wineries applying Rasch analysis

Vanessa Yanes-Estévez*, Ana María García-Pérez

Departmamento Dirección de Empresas e Historia Económica, Universidad de La Laguna, Pabellón de Gobierno, C/ Padre Herrera s/n, Apartado Postal 456, 38200, San Cristóbal de La Laguna, Santa Cruz de Tenerife, España
E-mail: vayanes@ull.edu.es; angape@ull.edu.es
*Corresponding author.

Abstract. This article identifies the opportunities and threats perceived by winery managers in the new general environment after to Covid-19. The sample comprised 66 wineries located in the Canary Islands (Spain), whose managers answered a questionnaire. This region has a long wine tradition and it has been re-developed and reborn via quality since the 1990s. Rasch analysis and its Differential Item Functioning (DIF) were used to process the information as novel competitive analysis tools. The main opportunities found are the islands' climate, in addition to the social values and lifestyle. The main threats are the unemployment rate and, with less much negative influence, all the restrictions and regulations derived from Covid-19. The only difference considering age and size of wineries is the influence of the climate: wineries that have been active for more than 30 years perceive it even as a greater opportunity, than the youngest ones. The results are useful both for existing wineries and for potential entrepreneurs who want to open a business in this sector to effectively focus their efforts on the existing opportunities.

Keywords: opportunity, threat, environment, Rasch, wineries.

1. INTRODUCTION

To grow and survive, organisations must inevitably interact with their environment [1]. So the first step in order to understand the firms' actions is to know their surrounding environment and the pressures and limitations derived from such circumstances [2]. That link between firms and their environment has been studied with various approaches and methodologies (for instance, the classics [2-5], to name a few). The environment and its analysis become a central aspect in the studies on the behaviour, decision-making and strategies of firms [6,7].

The fact that the strategies of firms are conditioned by their environment [8] has a special relevance after the most recent unpredictable and sudden disaster: the Covid-19[1] [9]. Although Covid-19 changed 'the rules of the

[1] The World Health Organization (WHO) declared a health emergency of international concern for Covid-19 on 30 January 2020. In Spain, the government declared a state of alarm on 14

game' for all industries and in all countries, normality has gradually been recovered for people and businesses. The first step in this return to normality for firms must be the analysis of the new circumstances of their environment to decide their new strategies from now. Social, cultural, economic, legal, technological or health-related changes have taken place because of Covid-19[2]. The different circumstances of the environment require different management responses [12]. Hence the importance of the analysis of this new environment, which is the primary objective of this paper.

Although all activity sectors and all kinds of firms have suffered the consequences of Covid-19, this work focuses on firms which are of special relevance for Spain and for the Canary Islands (where this work takes place), such as agrifood firms, and particularly wineries. The 50% drop of turnover in the hospitality sector in 2020 [11] and the closure of restaurants, bars and cafes [9], puts them in a particularly vulnerable situation and in need of a strategic vision to react.

Starting from the fact that the purpose of the analysis of the environment is to identify the external changes that will influence the activities of a firm [13], with a new environment around firms after Covid-19 and their need to strategically react, the aim of this paper is to make an environmental analysis to know the characteristics of that new environment that winery managers have in their mind when making decisions, whether being positive or negative. In particular, the paper identifies, on the one hand, the main positive environmental variables for wineries from which they could benefit, that is, their opportunities. On the other hand, the paper also highlights the main negative environmental variables for wineries whose consequences should be minimised in order to be competitive and even to survive, that is, their threats.

Thus, this paper makes important contributions. On the one hand, after an exceptional event such as Covid-19, firms have to return to normality knowing beforehand which characteristics of this new environment they can benefit from (opportunities) and which they should avoid (threats). This article identifies the main opportunities and threats perceived by the managers of wineries in this new world order. In small firms, which are the major ones in the wine sector, their strategies are more conditioned by the perceptions of the decision-maker than by objective and formal analyses and diagnoses of the company's environment [14]. Therefore, the results provided by this work will be very useful both for existing wineries and for potential entrepreneurs who want to open a business in this sector to effectively focus their efforts as it considers the information that they really have in mind while deciding.

For institutions and organisations in the wine sector, this work is a guide for designing new policies to help the sector and to promote wine activity, especially in regions like the Canary Islands (Spain). It is a region where the wine sector has been considered one of the few dynamic sectors of traditional agriculture [15] and it is deeply rooted in the culture. Finally, for researchers, apart from its own conclusions about wineries, this article proposes the application of a novel competitive analysis tool, the Rasch [16] modelling technique with a great potential of use.

2. THEORETICAL FRAMEWORK

2.1. The business environment and the environmental scanning

The importance of the business environment for firms has been demonstrated when conditioning a number of their organisational aspects. For example, their adaptive response [37], the formulation of their strategy [14], product innovation [17], alliance use [18], personal networking activities [19], organisational ambidexterity [12] or turnovers of SMEs [20], among many other aspects.

The business environment is defined as the relevant physical and social factors located outside the boundaries of the organisation that are directly taken into account when making decisions [3][3]. These elements that constitute the business environment are traditionally classified into two levels (e.g. [21-23]: task environment and general environment (Table 1). The task environment is usually defined based on the competitive forces of Porter [24]: the firms' customers and their current competitors are particularly considered for its study (e.g. [21,25]. Suppliers are sometimes added (e.g. [3,23]. On the other hand, the general environment comprises the charac-

March, limiting the free movement of people, which led to the confinement of the population until June, after which a gradual return to normality began.

[2] There are a number of studies on the impact of Covid19 focused on different aspects of society. Hidalgo-Pérez [10] and Blanco et al. [11] thoroughly made an analysis of the effects of Covid19 on the economy and Spanish firms and their causes. For example, the authors show that Spain was one of the most affected advanced economies by the pandemic with a drop of the GDP in 2020 of 10.8% [11].

[3] The importance of the environment for organisations has generated a wide variety of definitions, approaches and even contradictory results, leading to a fragmentation of their field of study [6]. Meinhardt et al. [6] and Robinson et al. [7] made a detailed review on the business environment literature, its dimensions, measures, background, turnovers and moderating effects.

Table 1. Environmental scanning of firms.

		Type of information being analysed (e.g. [30,38])	
		Objective (e.g. [31,32])	Perceived (e.g. [3,21,23,33])
Type of environment (e.g. [21, 22, 23])	General environment (socio-cultural, technological, political-legal and economic factors)	– Independent of the decision-maker. – All companies have to manage the same degree of uncertainty in the environment (general or specific).	– Based on deciders mental schemas and their bounded rationality. – Each company perceives a different degree of uncertainty in the environment (general or specific) that it has to manage.
	Task environment (customers, suppliers and competitors)	– Based on historical accounting data (e.g. stability of sales, value added)	– It is the information that is actually taken into account when making decisions: expected to be more strongly linked to the business strategy

Source: own elaboration.

teristics of the country or region where the company is located that may affect all its firms regardless their sector. It is defined based on different characteristics that varies slightly among authors depending on the context of their study. The most common factors are those included by Daft et al. [21], Elenkov [26], May et al. [27]: the socio-cultural, technological, regulatory and economic factors of the region. On the other hand, in a comparative study between firms in the United States and India, Stewart et al. [23] add the political-legal factors that entrepreneurs of both countries perceive similarly. These characteristics are also analysed in the works of Sawyerr [28] on the environment of firms in Nigeria, Elenkov [26] in Bulgaria, or May et al [27] in Russia. Sopha et al. [20] consider natural disasters as a relevant variable of the environment in a sample of SMEs in Indonesia.

Environmental analysis is the process of seeking and collecting information on events, trends and changes external to the firm that will guide its future course of action [29]. It is relevant then the type of information being analysed. The literature has traditionally suggested two approaches[4] (Table 1). The first one considers the environment as an objective reality independent of the decision-maker (for example, [31,32]). It would imply, for instance, that all firms in a sector would have to address the same degree and type of uncertainty [14]. The second perspective, which we follow in this work, defines the environment as a reality perceived by managers. Due to their limited rationality [33], the environment is characterised by managerial perceptions (for example, [3,19,21-23,34]). Under this perspective, strategic decisions and the behaviour of firms are conditioned by managerial perceptions and their interpretation of the environment [8,14,17,35-37]. Lueg and Borisov [30] conclude that both measures are not perfect substitutes and that perceptual measures are more suitable and complete for assessing the environment.

The events that have taken place in recent years, such as the Covid-19 pandemic, belong to the general environment of firms, affect to all of them, and have been particularly complex, of a special relevance and it spread rapidly worldwide. Thus, the general environment has become one of the greatest sources of uncertainty in recent years and a source of opportunities and threats that should be identified by firms. Thus, perceptions of the general environment in the mind of managers is the objective of this study.

2.2. Organisational environment and wineries

Like any other sector, the wine business environment also needs to be analysed to identify which variables determine or can determine the behaviour and development of its firms. However, no studies have been carried out that consider it as the main objective of their analysis, but it has been included as conditioning elements when explaining other concepts related to firms.

[4] Lueg and Borisov [30] analyse extensively the conceptual and methodological differences of characterising the environment through the two approaches suggested by the literature: in an objective way by means of archival environmental uncertainty and by means of perceived uncertainty.

When analysing wineries' strategies, there are works that consider some external factors as conditioning items. An example of this is Jordan et al. [39]. With the objective to identify the drivers of Australian winery success compared to French ones, they conclude that the emergence and success of the Australian wine industry is partially due to their environment: a simpler and more permissive wine legislation and a more innovative environment, among other factors.

Some of the environmental characteristics more frequently considered in the winery industry are those related to the natural environment and environmental sustainability. In this framework, Fernández-Olmos et al. [40] mention the high dependence of viticulture on external conditions derived from the natural framework of the environment, such as natural disasters, insect infestations, disease or drought. In relation to sustainability, Ouvard et al. [41] conclude that sustainability shapes the business model in the wine industry. Ferrer-Lorenzo et al. [42] also analyse the link between the winery's business model and sustainability, derived from the greater interest in ecological aspects shown by wine consumers.

Another important feature of the environment that has been analysed, although with a more marketing-focused approach, is consumer behaviour and habits (e.g., [43-47]), which is a socio-cultural characteristic of their environment. Related to that, Rossi et al. [48] in a study with Campania (Italy) wine firms conclude that the most important characteristics of successful wine enterprises is their ability to understand the environmental features related to consumer behaviour, that is, market trends and consumer behaviour patterns.

In recent times, the Covid19 pandemic has been considered as one of the key elements of the winery environment. Some articles focus on how consumer behaviour and buying decisions were affected by Covid-19 (for example, [49-51] and how the sector was affected (for example, [9]). For example, Alonso et al. [52], considering Italian and Spanish wine consumers, observed marginal changes in wine consumption during the crisis but important changes in consumer behavior: consumers showed more interest in wine events and wine routes and also their knowledge about the wine region and wine in general increased. Niklas et al. [53] analysed perceptions and reactions to Covid-19 in the wine industry, differentiating between firms from 9 countries from the Old World (France, Italy and Spain) and New World (South Africa, USA, Chile, Argentina, Australia and New Zealand) countries. They found significant differences in both the perception of impact and the response in terms of investment. In particular, New World countries perceive a greater impact than the other group. Macedo et al [54] specifically analyse the impact of governments' policy responses to Covid-19. They found that they had varying impacts on wine trade depending on whether it is an importing or exporting country.

These articles just highlight some of the factors that changed the competitive context of wineries. However, none of them make a complete analysis of their environment putting all relevant items together to know their relative importance negative influence or positive influence.

3. RESEARCH METHODOLOGY

3.1. The sample and data collection

This study takes place in the Canary Islands (Spain), one of the Spanish regions 'with the oldest traditions in vine cultivation and wine production' [47, p. 70][5].

The Canary Islands is an archipelago made up of 8 volcanic islands and several islets in the Atlantic Ocean, off the Northwest coast of Africa. The islands' climate is subtropical with gentle temperatures all year round mainly due to the trade winds. This climate presents variations both between islands and even within one same island resulting in microclimates. This creates a wide and varied biodiversity and landscapes and natural spaces that range from laurel forests to lava flows and to large extensions of sand dunes. This natural value has turned tourism, mainly sun and beach mass tourism, into the region's main economic activity, alongside agriculture, traditionally focused on bananas.

Vine is the second most important crop in the Canaries depending on the area occupied [56]. There are 11 wine Designations of Origin out of a total of 101 in Spain [57]. In the report by the Instituto Canario de Calidad Agroalimentaria (2009-2010) [58] two factors of the islands' environment are mentioned as determinants of the characteristics of their wine: climate and soil.

Wineries are usually family farms, with a highly artisanal production, high production costs [59] and great difficulties in terms of generational renewal [60].

Its contribution to the region is not only economic but also fulfils a landscape function, in addition to environmental conservation and preservation of old varieties [15]. At the end of the last century, the sector modernised significantly and maintained a process of growth

[5] Alonso [55] presented the Canary Islands wine production as similar in history, tradition and heritage to that of the Croatia wine industry. Thus, this paper contributes not only to the knowledge of the wine sector in the Canary Islands but also to other wine regions.

due to the decisive support of the public administrations [61]. The creation of the Designations of Origin also meant a turning point for the sector by encouraging the search for quality [62] and contributing to its professionalisation and future competitiveness [63]. This way, in recent decades, the islands' wine has been revalued, has acquired a social prestige, making significant investments in infrastructure for cultivation and in the improvement of wineries [15].

As a way to find new and different wine consumers, wineries are slowly moving towards their diversification and are focusing their attention on tourists. However, the works of Alonso and colleagues [55,63-66] still observe a lack of wine tourism culture in the sector and suggest its development as a natural extension from the traditional product [55]. Thus, the initiatives that combine wine, culture, tradition and tourism will allow using the potential of tourism in the region and therefore increase sales [66] and contribute to the economic development of the region [67]. Alonso et al. [65] identify at the same time some threats from the environment for its development like the luggage restrictions on flights, the anti-drink-drive laws or the prepaid travel packages [55].

The information needed to make the environmental analysis of wineries was obtained from a sample of wineries located in the Canaries (Spain). During February and the beginning of March of 2022, managers were contacted by phone, in person or via email to request their participation in the study. The survey process ended on 19 March, 2022. The total number of wineries that answered the questionnaire was 66 from a total population of 86 wineries according to the SABI[6] (76.74% response rate), being all the questionnaires received valid. They constitute our sample (Table 2).

The wineries of the sample (Table 2) are characterised by being mostly micro enterprises (75.8%) and small enterprises (21.2%). Regarding their age, the most numerous group of wineries are over 30 years old (31.8%), followed by the ones that are between 21 and 30 years old (28.8%), and those that are up to 10 years old (27.3%). In relation to their markets, it is surprising that the largest group of wineries aspires to cover all markets (37.9%), which would include both regional and national and international markets. It is followed in importance by the group of wineries focused on a local and insular market (27.3%), perhaps linked to the wineries with lower capacity.

[6] SABI (Sistema de Análisis de Balances Ibéricos) by Bureau Van Dijk (a Moody-s Analytics Company) in one of the most comprehensive databases on Spanish and Portuguese companies. It provides contact details of the companies, their descriptive characteristics and their annual accounts that the authors need for their research project.

Table 2. The sample (N=66 wineries).

	Number	%
Age		
0-10 years	18	27.3%
11-20 years	8	12.1%
21-30 years	19	28.8%
More than 30 years	21	31.8%
Total	66	100%
Size		
Microenterprise	51	77.3%
Small winery	14	21.2%
Medium sized winery	1	1.5%
Total	66	100%
Markets		
Local and island market	18	27.3%
Regional market	11	16.7%
National market	10	15.2%
All markets	25	37.9%
Missing data	2	3%
Total	66	100%

Source: own elaboration.

In short, our wineries show the characteristics that have defined the wineries of the Canary Islands for centuries: they are mostly micro enterprises with a long tradition.

3.2. The questionnaire

The research team designed a questionnaire *ad hoc* with two parts. In the first section managers should indicate the descriptive characteristics of the wineries (name, location, date of establishment, number of employees and markets). In the second part managers should answer the question "Please rate the influence of the following environmental items on the management of your winery (1 being a very negative influence and 5 being a very positive influence)". Based on the literature, they had to assess a total of 12 items belonging to the following segments of their general environment (Table 3):

- Geographic segment: the geographical characteristics of the Canaries are determining factors of the region, its firms and its wines [58].
- Economic segment: given the commitment of the wineries for the quality and modernisation of their facilities in recent times, it is important to know if the development of the Canaries in terms of infrastructures, transport or communications could support their own development. In addition, given

Table 3. Environmental segments and items.

Please rate the influence of the following environmental ítems on the management of your winery (1 being a very negative influence and 5 being a very positive influence)	
Segment	Items to be assessed
Geographic segment	1. Location of the Canaries 2. Geography of the Canaries 3. Climate
Economic segment	4. Development in the Canaries 5. Purchasing power 6. Unemployment
Politic-legal segment	7. Political situation 8. Laws 9. Covid19 protocol
Socio-cultural segment	10. Social values and habits 11. Demographic factors 12. Education and training level

Source: own elaboration.

Table 4. Descriptive statistics of environmental items.

	Min	Max	Mean	St. dev.
1. Location of the Canaries	1	5	3.11	1.054
2. Geography of the Canaries	1	5	3.44	0.914
3. Climate	2	5	3.97	0.894
4. Development in the Canaries	1	5	3.11	0.897
5. Purchasing power	2	5	2.89	0.787
6. Unemployment	1	4	2.23	0.652
7. Political situation	1	5	3.03	0.701
8. Laws	1	4	3.02	0.813
9. Covid-19 protocol	1	5	2.67	1.043
10. Social values and habits	2	5	3.88	0.713
11. Demographic factors	1	5	3.33	0.829
12. Education and training level	2	5	3.14	0.654

Source: own elaboration.

that the price of wine is sometimes established as an important determinant of purchasing decisions [68], the purchasing power of the population and the unemployment rate, as one of the most remarkable characteristics of the region defines the main economic features of their environment.

– Politic-legal segment: includes general characteristics of the political situation as a reflection of the greater or lesser institutional support to the sector, which has been decisive for its development [61]; the laws that, as in the case of luggage restrictions on flights and the anti-drink-drive laws, have posed threats to the sector in other times [55], and the Covid19 protocols, as a reflection of the specific provisions derived from the Covid-19 situation.
– Socio-cultural segment: includes the determining characteristics of the society for the decisions of wine consumers such as the profile of the consumer (e.g. [47,69]).

The quality of the measurements was analysed by means of the statistics given by the Rasch model, which was applied in the study. The reliability shows satisfactory levels, both for wineries (reliability of 0.70) and for the items of the scale (reliability of 0.96). Validity and unidimensionality were also checked.

Table 4 provides a descriptive analysis of the answer to the items. It already shows the importance of the climate and social values and habits, which has the highest means and the most positive influence. In contrast, unemployment has the lowest mean of all the items and the most negative influence. This last item is the one with the lowest St. deviation.

3.3. Rasch analysis

Rasch analysis [16] was developed to improve the precision of the researchers in the construction and use of instruments for measurement [70]. It has been traditionally used on Medicine, Psychology and especially on Education. Its application in the business field is more recent [71-75]. As a result, it is defined as an "important methodological advance for management research" [76, p. 1).

One of its main advantages is related to the type of variables that, in general terms, are used in the field of management: the latent variables, those that are not directly measurable, like the influence of the environment, which is considered in this paper. Rasch analysis [16] is particularly suitable for the measurement of these variables. In fact, according to Wright and Stone [77, p. 34] "is the only method for constructing measures from observations", or, in other words, transforms the data into "objective" measures [73]

Regarding the approach of the analysis, while other data management techniques try to characterise the whole sample of the study, the Rasch analysis [16] focuses on the individualised analysis of each of the subjects of the study, whether patients, students or wineries, in our case. This way, there is no need to assume that the set of data follows a normal distribution [78] for its application. This approach allows a detailed analysis at an individual level of the behaviour of both each subject and each item [76].

In addition, it is defined as a conjoint measurement model and the estimated parameters of the sub-

jects as well as those of the items are expressed in the same units of measurement, *logits*. This allows developing the conjoint analysis, which is another advantage of this technique. This way, subjects and items are located simultaneously on the linear continuum that describes the variable analysed (the latent variable), so that each item can be evaluated with respect to each subject and each subject with respect to each item.

The Rasch Rating Scale Model, developed by Andrich [79,80] is the one applied in this work. It is particularly suitable for being applied with ordinal multiple category scales, such as the ones used in this work.

For the analysis of the latent variable *environmental influence,* this methodology starts from the scores of a group of wineries (subjects) about a set of items (items of the environment). With these scores, a model that explains such variable and the parameters is estimated, both for the subjects (wineries) and the items (items of the environment). Then, the parameters are located on a linear continuum that represents the latent variable.

The parameters of the wineries (subjects-βn) and the parameters of the environmental items (items-δi) are simultaneously located on the linear continuum (Figure 1). According to the scale used from 1 (high negative influence) to five (high positive influence), their location on the continuum gives the items a character that goes from more positive influence (items lower on the continuum and with the smaller measurements) to more negative influence (items located higher on the continuum and with the bigger measurements). Similarly, the wineries are also placed along the continuum. In this case, it is indicated whether the wineries perceive the influence of the environment as being negative or like a threat in general (wineries located at the top of the continuum with the bigger measurements) or like a positive aspect or like an opportunity (wineries located at the bottom of the continuum with the smaller measurements).

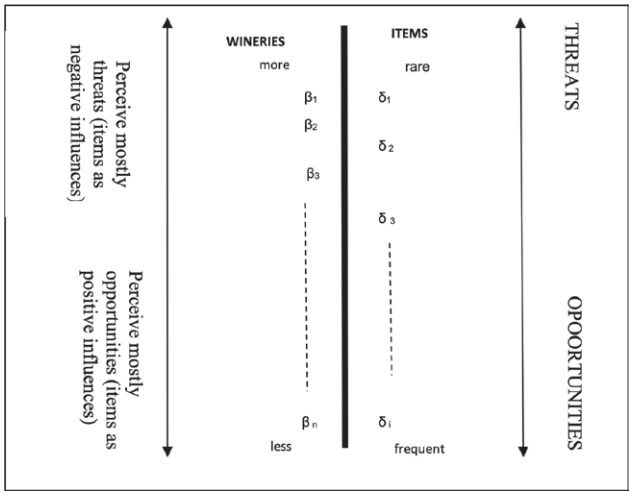


Figure 1. Lineal continuum.

From a mathematical point of view, it is expressed as follows (based on [72]):

P_{nij} is the probability of a subject *n* with skill $ß_n$ choosing category j on a common scoring scale applied to item *i* of difficulty d_i. Then, $P_{ni\,(j-1)}$ is the probability of selecting category (j-1). The Neperian logarithm of the defined ratio odds would be:

$$\ln \frac{P_{nij}}{1-P_{ni(j-1)}} = \beta_n - \delta_i - \tau_{ij} \quad (1)$$

where $ß_n$ and d_i represent the measurements in the dichotomous Rasch model [16], and t_j is the Rasch-Andrich threshold. It would be the point in the latent variable at which the probability of selecting category j is the same as that of selecting category (j-1), considering the difficulty of item i.

The expression of that probability would be:

$$P_{nij} = \frac{1}{\gamma} \exp\left[j(\beta_n - \delta_i) - \sum_{k=1}^{j} \tau_h \right] \quad (2)$$

where t_1 is 0 and g a normalised/standardised factor that reflects the sum of all the possible numerators.

The work is undertaken with two facets that interrelate in the Rasch Model (wineries and items of the environment), where:

$ß_n$ is the parameter of the skill of wineries n, and whose field of variation n ={1,…,N} (sample of wineries);

d_i is the parameter of the difficulty of item i, and whose field of variation is i = {1, L}(sample of items considered), which would be the influence of the item.

The parameters are estimated using a maximum likelihood method through the software *Winsteps 3.92.1* (Linacre, 2016), which considers the algorithms PROX and JMLE (*joint maximum likelihood estimation*)[7].

4. RESULTS

The results were obtained by applying the software *Winsteps 3.92.1* to the answers given by the managers of wineries about their perceptions of the environment. The program estimates the explanatory model of the latent variable "environmental influence" and the linear continuum (Figure 2) that represent it. Figure 2 shows

[7] To delve deeper into the fundamental and probabilistic mathematical developments of this methodology see, among others, Wright and Stone [77].

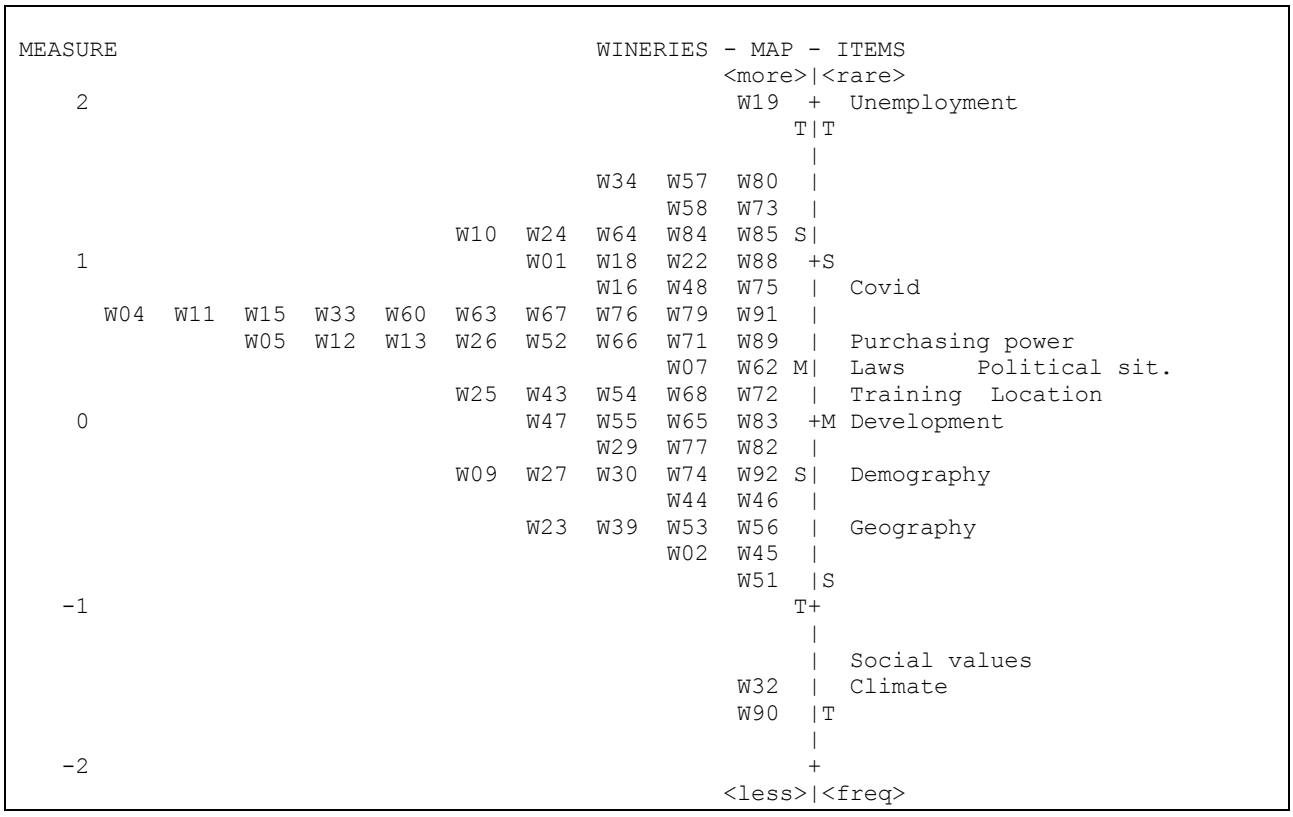


Figure 2. Opportunities and threats for wineries. Source: own elaboration.

the parameters of the environmental items on one side and the parameters of the wineries on the other side. The exact location of each parameter on the continuum is determined by the measurements estimated by the model (Table 5). From these measurements and their location in the continuum, the perception of the items as opportunities or threats of the environment is deduced: the items lower on the continuum and with the smaller measurements are the ones perceived as opportunities and items located higher on the continuum and with the bigger measurements are perceived as threats.

Two items stand out for being located particularly on the lower part of the linear continuum with the smallest measurements (Figure 2 and Table 5): climate (-1.56 logits) and social values and habits (-1.42 logits). According to the explanations in the methodological section, such smallest measurements make these influences to be perceived as the two main positive ones generated by the environment and thus constituting their main opportunities. Climate is particularly positive for wineries and continues to be a great opportunity for the sector as a key determinant of the characteristics of the islands' wine [58]. From the joint analysis of items and wineries, it can be seen that, however, there are two wineries W32 (-1.62 logits) and W90 (-1.81 logits) that perceive the climate as a threat since they are located below this variable on the continuum and their measurements are lower than that of the climate (-1.56 logits).

As for the social values and habits of society, they are also perceived as an opportunity that wineries can take advantage of since wine and wineries are rooted in the culture of local society [65]. Therefore, they are part of their habits and values due to the long winemaking tradition of the region [47].

Unemployment rate (1.87 logits) lies on the opposite side of the continuum, thus being the greatest negative influence and the main threat perceived by the managers of wineries, with a significant difference over the rest. The level of unemployment in the Canary Islands is one of the highest in Spain, standing at 25.2% at the end of 2020 compared to 16.1% of the country's total [82]. However, from the joint analysis of items and wineries, one exception can be observed: W19 winery (2.00 logits). This winery is the only one that considers unemployment as an opportunity since it is located slightly above this item on the continuum and its measurement is slightly higher than that of the latter. It is a small winery, more than 30 years old and selling its wines in the local market.

Table 5. Environmental item measures.

Items	Measure	Model S.E.	Infit	Outfit	PTMEA Corr.
			MNSQ	MNSQ	
Unemployment	1.87	0.18	0.88	0.94	0.18
Covid-19	0.82	0.17	1.62	1.61	0.42
Purchasing power	0.50	0.17	0.93	0.94	0.43
Laws	0.28	0.17	0.82	0.83	0.58
Political situation	0.25	0.17	0.71	0.72	0.48
Education/Training	0.15	0.17	0.58	0.57	0.44
Location	0.10	0.17	1.23	1.22	0.63
Development	0.04	0.17	0.89	0.89	0.61
Demographic factors	-0.40	0.17	1.03	1.04	0.34
Geography	-0.64	0.17	1.08	1.08	0.53
Social values and habits	-1.42	0.18	0.74	0.75	0.53
Climate	-1.56	0.18	1.41	1.41	0.39
MEAN	0.00	0.17	0.99	1.00	
P.SD.	0.90	0.00	0.29	0.28	

Source: own elaboration.

Contrary to what might be expected, Covid-19 and all the legislation and regulations in this regard (0.82 logits) are not the greatest threat to wineries but the second most negative influence, at a remarkable distance from unemployment. Once the great influence of Covid-19 has been overcome[8], most of the restrictions and regulations have been eliminated and the time and spaces lost are trying to be recovered.

The rest of the items are found on the central part of the continuum. If the mean influence of the set of items (0.00 logits) is taken as reference, there are two variables that make a more positive influence than the mean of variables, although lower than that generated by climate and social values and habits, which are considered the main opportunities. These two items that equally favour the sector are the geography of the Canaries (-0.64 logits) and demographics (-0.40 logits). The rest of items have higher measurements than the mean and therefore would generate a negative influence on wineries, although these threats would not be as serious as unemployment and Covid-19. The purchasing power of the population (0.50 logits), which is a determining factor in the purchasing decisions of consumers and particularly linked to unemployment, is one of them.

The items linked to legislation (0.28 logits) and the general political situation (0.25 logits), along with the level of training of the population (0.15 logits), the location of the Canary Islands (0.10 logits), and the level of development of the Canary Islands (0.04) are also located as negative influences, although with less intensity.

Table 6. Differential Item Functioning considering age and size of wineries*.

Winery class	DIF Measure	DIF S.E.	Winery class	DIF Measure	DIF S.E.	DIF Contrast	Prob.	Item
0-10 years	-1.41	0.33	More than 31 years	-2.58	0.36	1.17	0.0233	Climate

*This table shows only the significant differences found. The results for the other items, considering age and size have a probability higher than 0.05 and made them non significant.
Source: own elaboration.

To complement the results obtained, another tool provided by the Rasch analysis has been applied: the Differential Item Functioning (DIF)[9]. This indicator allows us to know if there are significant differences in how wineries perceive the influence of their environment depending on their age or size (Table 6). The results obtained show us that there is only one significant and relevant difference (prob. 0.0233 and Dif contrast 1.17) if we take into account the age of the wineries and only in relation to how they perceive the influence of the climate. This way, the group of wineries that have been active for more than 30 years perceive the influence of the climate even more positively than the group formed by the youngest wineries (0 to 10 years). The reason could be that younger wineries are often run by younger people. It is precisely these young people who are more environmentally and climate conscious and perceive climate less as an opportunity than older people who are supposed to run older wineries [10]. The rest of the aspects of the environment are not perceived as significantly different by the wineries according to their age after Covid-19. In the case of the size of the wineries, no significant differences have been found in how they perceive the influence of the environment.

[8] It should be noted that at the time of the management survey (February - March 2022), the most critical period of the Covid crisis and the period of home confinement (March - June 2020) had passed, although some of the social, technological and economic consequences were still present.

[9] The analysis of the residuals derived from the process of data adjustment to the model allows verifying the presence of a differential item functioning (DIF) between the groups of wineries. The estimation of this DIF is performed using a hypothesis contrast to determine whether the difference in the location measures of the items in each subsample is significant.

[10] Research founded by El Observatorio Social de la Fundación "La Caixa", carried out by Rodon and Guinjoan [83] on whether attitudes towards climate change in Spain vary with age, concludes that young people tend to be more concerned about climate change, even more so than the economy. Specifically, 42% of 16-25 year olds and 35% of 26-35 year olds consider climate change to be one of the three main current problems.

5. CONCLUSIONS, IMPLICATIONS AND FUTURE LINES OF RESEARCH

5.1. Conclusions

A first noteworthy contribution of this article is that it carries out an analysis of the new environment after Covid-19 of the wineries located in the Canary Islands (Spain), a region with a special winemaking tradition and unique and differentiated wines, which can serve as a reference for other areas and wineries as well as for new entrepreneurs in the sector.

After the application of an innovative methodology in this field, such as the Rasch's analysis [16], another of the noteworthy contributions of the article is that it identifies that the great opportunity offered by the environment to wineries is still the natural characteristic that has traditionally been considered one of the great drivers of the sector, regardless of the winery's size: the climate, determining factor of the characteristics of the wine of the Canary Islands along with the soil [58]. This item is particularly positively by wineries that have been active for more than 30 years. The perceived great variety of microclimates existing in the Canary Islands, together with the richness of vine varieties, allows us to predict the most appropriate grape for each microclimate so that it can develop its entire cycle in the best conditions [84].

In addition, the climate is one of the permanent elements that are fixed when planting, being in turn the regulator of the development processes of the vine cycle [85]. Hence, this favourable climate is considered one of the factors that determines with greater impetus the viticultural vocation of the islands [84].

On the other hand, the warm and mild climate all year round in the Canary Islands is the most important aspect when choosing the Canary Islands as a tourist destination [86]. The visitors, potential wine consumers, are increasingly looking for new and differentiated experiences apart from the sun and beach offer, such as guided tours, social events in wineries and wine tastings. These events are the natural extension from the traditional product of wineries [55], which should be exploited with greater determination by wineries within the framework of wine tourism.

Social values and habits are found as the second source of opportunities. Wine and wineries have been part of the culture of local society for centuries [64] and are part of its habits and values due to the region's long winemaking tradition [47]. Apart from that, after months of confinement, lockdowns, and social distances, society has returned to normality and it implies that family and friends gatherings (birthday celebrations, anniversaries, weddings, graduations, business lunches or Christmas), social events (inaugurations, exhibitions, cultural festivals, book presentations, among others) or popular festivals (carnivals, pilgrimages, or religious festivities) play an important role in people life after being missed for a long time. All these events are important for the wine sector as it is "part of a bundle consumed in social activities" [9, p. 843].

After the wine market very strong contraction in 2020 [53], the great threat to wineries is not Covid-19 and its protocols. The great threat to wineries has been one of the pandemic's consequences, the increase of the unemployment rate, with a substantial difference over the rest of the environmental variables. The unemployment rate has important consequences for the purchasing power of families after a difficult period, with lockdown periods, with the paralysis of the vast majority of economic activities and in which the savings of families served as a great help to solve the economic problems in many cases. Besides that, it is important to know that the main wine consumers of these wineries are the islands' residents, being more likely to consume wine if they are civil servants or employees [87]. Apart from that, price is one of the determinants of wine consumption [68].

In short, the general environment is perceived by managers as an important source of opportunities for the wine sector of the islands by presenting natural conditions, like climate, and social conditions that favour their development. However, it also provides threats, such as unemployment, which could affect the Canary Islands wine market, where the wineries do not precisely compete on price. Finally, after the negative shock of pandemic [53], the sector's perception of the general environment seems to be similar for wineries in the Canary Islands. With the exception of climate, wineries, regardless of their age and size, perceive the same opportunities and threats in their general environment.

5.2. Implications

A first implication of this study is the clear evidence that the wine sector in the Canary Islands is aware of having in its favour the natural conditions of the islands, such as climate, regardless of the size of the winery. Furthermore, the climate is one of the main tourist attractions of the islands and its visitors should be clearly seen as potential consumers of their wine. In addition to this, tourists who arrived on the islands in 2021 made their greatest expenditure, without considering accommodation, in restaurants and cafes and enjoy trying the local gastronomy [86]. This means that wineries have a clear market niche to address in tourists and must decisively

complement their offer with leisure activities (guided tours, cultural events or tastings). Activities not only aimed at tourists but also at residents, since a greater interest of consumers in the wine culture has been observed in general [69]. However, despite having the potential for this, there is a lack of a wine tourism culture in the sector [55,63-66]. This shows that, despite the favourable natural conditions, the recent improvements in the professionalisation of the sector and the quality controls exercised by the designations of origin, there is still much work to be done, especially in the search for synergies with other sectors such as tourism. Tourism sector, which in its new strategy after Covid-19, aims precisely to promote the integration of everything local and the complementarity with the rest of the sectors of the economy of the Canaries[11]. The wine sector must also take special advantage of the "proposition" made by the tourism sector for the diversification of its offer, further exploiting the obvious synergies that exist between both sectors.

With a clear commitment to wine tourism, wineries could also minimise the negative effects of the main current threat to the sector, unemployment, a traditional evil of the local economy that has worsened after Covid-19 and difficult to solve in the short and medium term.

From the point of view of public institutions, this paper has also important implications. It goes into managers' minds to know how they perceive their environment and what they have really present when making decisions. The first implication is the need to continue proposing policies to improve employment in the Canary Islands, mainly youth employment, since it is negatively conditioning their future. Secondly, the institutions must continue to carry out actions to improve the competitiveness of the sector, aimed at modernising facilities, improving their varieties, training winegrowers, positioning an institutional brand of 'Canarian wines' and diversifying its offer. A good example in this regard is the Aid for investments of the Wine Sector Intervention within the framework of the Strategic Plan of the Common Agricultural Policy (Royal Decree 905/2022 of October 25) in which the need for a change of orientation in the sector is highlighted, or the Rural Development Program of the Canary Islands, whose purpose is to contribute to the development of a more competitive agricultural sector and to the improvement of the viability of farms, especially important given that local wine is more expensive to produce [64]. It is also necessary for the designations of origin and municipalities to get involved by organising events such as the V Enogastronomic Fair of Santa Úrsula (January-March 2023), the Territory and Wine Festival in Tegueste (March 2023), which includes blind wine tasting, vineyard routes and visits to wineries, narration sessions, cinema, music, humour and stargazing accompanied by wine tasting, or the 10th Gran Canaria Me Gusta Fair (April 2023), to highlight local products, such as wine.

From the point of view of the methodology used, the Rasch's analysis [16] and its potential, a practical use of this study is also represented, both for the sector and for public institutions and other researchers. The individualised treatment of the items but particularly of the wineries is especially important, since it allows us to know what each winery considers as a threat and what it perceives as an opportunity, being decisive in view of the new competitive framework after Covid-19 and the need to return to normality while reorienting strategically the sector.

5.3. Future lines of research

This work also represents an important contribution to the literature since a whole line of research can be developed from these preliminary results.

One of the future lines should be aimed at solving one of the limitations of this study, that is, the size of the sample used. For example, wineries from other regions of Spain, such as those in the Balearic Islands, which share characteristics with the Canary Islands such as the fragmentation of the territory and the importance of the tourism sector, could be incorporated. Undoubtedly, the extension to the entire Spanish territory would be ideal or even incorporating wineries from other countries.

Those related to climate change could also be included as variables of the general environment to be considered and valued by the winemaker, as it is evident that global warming is affecting the sector and modifying its way of growing and selling wine and also its final product.

Once the general environment of the wineries has been analysed, a second step would be to make a diagnosis of their specific environment and the bargaining power exercised over the wineries by their suppliers, customers and, mainly, their competitors, whose rivalry in quality and price is evident when consulting the market shares of the major brands and Designations of Origin,

[11] The Government of the Canary Islands [88] has proposed a strategy to transform the tourism model of the Canaries after Covid-19. In one of their plans, they propose "the extension and cohesion of the value chain" increasing the presence of the "Canarian component" in all tourist services, as a way to differentiate the destination. Furthermore, they consider as one of their goals that 'the success of our tourism model is to make the rest of the economic activity of the Canary Islands benefit from the traction to offers'. Available in https://turismodeislascanarias.com/es/

that continue to reign in the Spanish tables, such as Rioja, Ribera del Duero or Rueda.

From the point of view of the technique applied, the Rasch methodology [16], it could delve into the tools it provides and further exploit its potential. For example, a differential analysis of groups of wineries and groups of items could be made in order to know if, in general terms, there is some segment of the environment that is in itself an opportunity or if there is some that is a threat as a whole. Or the differential item functioning, depending on the location of the winery, which would delve into the differentiated management by islands or areas.

REFERENCES

[1] Dyer, L. M., and Ross, C. A. (2008). Seeking advice in a dynamic and complex business environment: Impact on the success of small firms. Journal of Developmental Entrepreneurship, 13 (02), 133-149. https://doi.org/10.1142/S1084946708000892

[2] Pfeffer, J., and Salancik, G. R. (1978). The external of organizations: A resource–dependence perspective. Harper & Row, New York.

[3] Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative Science Quarterly*, *17* (3), 313-327. https://doi.org/10.2307/2392145

[4] Lawrence, P. R., and Lorsch, J. W. (1967). Differentiation and integration in complex organizations. Administrative science quarterly, 12,1-47. https://doi.org/10.2307/2391211

[5] Lenz, R. T., and Engledow, J. L. (1986). Environmental analysis: The applicability of current theory. Strategic Management Journal, 7(4), 329-346. https://doi.org/10.1002/smj.4250070404

[6] Meinhardt, R., Junge, S. and Weiss, M. (2018). The organizational environment with its measures, antecedents, and consequences: a review and research agenda. *Management Review Quarterly, 68*, 2195-235. https://doi.org/10.1007/s11301-018-0137-7

[7] Robinson, C.V., Ahmad, F. and Simmons, J.E. (2021). Consolidation and fragmentation in environmental scanning: A review and research agenda. *Long Range Planning*, *54* (3), 101997. https://doi.org/10.1016/j.lrp.2020.101997

[8] Şener, İ. (2012). Strategic responses of top managers to environmental uncertainty. Procedia-Social and Behavioral Sciences, 58, 169-177.https://doi.org/10.1016/j.sbspro.2012.09.990

[9] Wittwer, G., and Anderson, K. (2021). COVID-19's impact on Australian wine markets and regions. Australian Journal of Agricultural and Resource Economics, 65(4), 822-847.

[10] Hidalgo-Pérez, M. (2021). El impacto económico del COVID-19 en España. Información Comercial Española, ICE: Revista de Economía, 923, 91-103. https://doi.org/10.32796/ice.2021.923.7327

[11] Blanco, R., Mayordomo, S., Menéndez, Á., and Mulino, M. (2021). Los efectos de la crisis de la COVID-19 sobre la evolución económica y financiera de las empresas españolas. *Papeles de Economía Española*, *170*, 62-75.

[12] Mammassis, C. S., and Kostopoulos, K. C. (2019). CEO goal orientations, environmental dynamism and organizational ambidexterity: An investigation in SMEs. European Management Journal, 37(5), 577-588. https://doi.org/10.1016/j.emj.2019.08.012

[13] Du Toit, A.S. (2016). Using environmental scanning to collect strategic information: A South African survey. International Journal of Information Management, 3 (1), 16-24. https://doi.org/10.1016/j.ijinfomgt.2015.08.005

[14] Parnell, J.A., Lester, D.L. and Menefee, M. L. (2000). Strategy as a response to organizational uncertainty: an alternative perspective on the strategy-performance relationship. Management Decision, 38 (8), 520-530.https://doi.org/10.1108/00251740010352811

[15] García-Rodríguez, J. L. (2019). La política agraria europea y el cultivo de la vid en las Islas Canarias. *Biblio3W Revista Bibliográfica de Geografía y Ciencias Sociales*, XXIV,1263.

[16] Rasch, G. (1960). *Probabilistic models for some intelligence and attainment tests.* Danish Institute for Educational Research. Copenhagen.

[17] O'Regan, N., and Ghobadian, A. (2005). Innovation in SMEs: the impact of strategic orientation and environmental perceptions. International Journal of Productivity and Performance Management, 54 (2), 81-97. https://doi.org/10.1108/17410400510576595

[18] Dickson, P.H. and Weaver, K.M. (1997). Environmental determinants and individual-level moderators of alliance use. Academy of Management Journal, 40 (2), 404-425.https://doi.org/10.5465/256888

[19] Sawyerr, O. O., McGee, J., and Peterson, M. (2003). Perceived uncertainty and firm performance in SMEs: The role of personal networking activities. International Small Business Journal, 21(3), 269-290. https://doi.org/10.1177/02662426030213002

[20] Sopha, B.M., Jie, F. and Himadhani, M. (2021). Analysis of the uncertainty sources and SMEs' performance. *Journal of Small Business & Entrepre-*

neurship, 33 (1), 1-27. https://doi.org/10.1080/08276331.2020.1764737

[21] Daft, R.L., Sormunen, J. and Parks, A. (1988). Chief executive scanning, environmental characteristics and company performance: an empirical study. *Strategic Management Journal, 9*, 123-139. https://doi.org/10.1002/smj.4250090204

[22] Sawyerr, O. O., and Ebrahimi, B. P. (2022). Executive environmental scanning and strategic uncertainty: the impact of institutional context. *International Studies of Management & Organization*, *52* (1), 7-24. https://doi.org/10.1080/00208825.2021.2023442

[23] Stewart Jr, W. H., May, R. C., and Kalia, A. (2008). Environmental perceptions and scanning in the United States and India: convergence in entrepreneurial information seeking?. *Entrepreneurship Theory and Practice*, *32* (1), 83-106.

[24] Porter, M. (1980). *Competitive Strategy.* Free Press, New York.

[25] Abu-Rahma, A. and Jaleel, B. (2019). Perceived uncertainty and use of environmental information in decision making: The case of the United Arab Emirates. *International Journal of Organizational Analysis, 27 (3), 690-711.* https://doi.org/10.1108/IJOA-07-2017-1205

[26] Elenkov, D.S. (1997). Strategic uncertainty and environmental scanning: the case for institutional influences on scanning behavior. *Strategic Management Journal*, *18* (4), 287-302. https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<287::AID-SMJ865>3.0.CO;2-B

[27] May, R.C., Stewart, W.H and Sweo, R. (2000). Environmental scanning behaviour in a transitional economy: evidence from Russia. *Academy of Management Journal, 43* (3), 403-427. https://doi.org/10.5465/1556402

[28] Sawyerr, O. (1993). Environmental uncertainty and environmental scanning activities of Nigerian manufacturing executives: a comparative analysis. *Strategic Management Journal, 14*, 287-299. https://doi.org/10.1002/smj.4250140405

[29] Aguilar, F. J. (1967). Scanning the business environment. MacMillan, New York.

[30] Lueg, R., and Borisov, B. G. (2014). Archival or perceived measures of environmental uncertainty? Conceptualization and new empirical evidence. European Management Journal, 32 (4), 658-671. https://doi.org/10.1016/j.emj.2013.11.004

[31] Castrogiovanni, G.J, (2002). Organization task environments: Have they changed fundamentally over time?. Journal of Management, 28 (2), 129-150.https://doi.org/10.1177/014920630202800

[32] Dess, G. and Beard, D. W. (1984). Dimensions of organizational task environments. Administrative Science Quarterly, 29, 52 – 73. https://doi.org/10.2307/2393080

[33] Simon, H. (1957). Administrative Behaviour. The Free Press, New York.

[34] Joshi, M. and Anand, V. (2018). Small business owners' external information-seeking behaviors: The role of perceived uncertainty and organizational identity complexity. Journal of Small Business Strategy, 28(3), 48-68.

[35] Nadkarni, S. and Barr, P.S. (2008). Environmental context, managerial cognition and strategic action: an integrated view. Strategic Management Journal, 29, 1395-1427.https://doi.org/10.1002/smj.717

[36] Simsek, Z., Veiga, J. F., & Lubatkin, M. H. (2007). The impact of managerial environmental perceptions on corporate entrepreneurship: Towards understanding discretionary slack's pivotal role. Journal of Management Studies, 44(8), 1398-1424. https://doi.org/10.1111/j.1467-6486.2007.00714.x

[37] Strandholm, K., Kumar, K., and Subramanian, R. (2004). Examining the interrelationships among perceived environmental change, strategic response, managerial characteristics, and organizational performance. Journal of Business Research, 57(1), 58-68. https://doi.org/10.1016/S0148-2963(02)00285-0

[38] Weiss, M. and Wittmann, C. (2018). Objective environmental conditions and perceived environmental uncertainty. Journal of Accounting & Organizational Change, 14 (1), 33-60.https://doi.org/10.1108/JAOC-11-2016-0079

[39] Jordan, R., Zidda, P., and Lockshin, L. (2007). Behind the Australian wine industry's success: does environment matter?. *International Journal of Wine Business Research*, *19* (1),14-32. https://doi.org/10.1108/17511060710740325

[40] Fernández-Olmos, M., Rosell-Martínez, J., and Espitia-Escuer, M. A. (2009). Vertical integration in the wine industry: a transaction costs analysis on the Rioja DOCa. *Agribusiness*, *25 (*2), 231-250. https://doi.org/10.1002/agr.20196

[41] Ouvrard, S., Jasimuddin, S. M., and Spiga, A. (2020). Does sustainability push to reshape business models? Evidence from the European wine industry. *Sustainability*, *12 (*6), 2561. https://doi.org/10.3390/su12062561

[42] Ferrer-Lorenzo, J. R., García-Cortijo, M. C., Pinilla, V., and Castillo-Valero, J. S. (2022). The business model and sustainability in the Spanish wine sector. *Journal of Cleaner Production*, *330*, 129810. https://doi.org/10.1016/j.jclepro.2021.129810

[43] Boncinelli, F., Dominici, A., Gerini, F., and Marone, E. (2021). Insights into organic wine consumption: behaviour, segmentation and attribute non-attendance. *Agricultural and Food Economics*, *9* (1), 1-16. https://doi.org/ 10.1186/s40100-021-00176-6

[44] Gow, J., Rana, R.H., Moscovici, D., Ugaglia, A.A., Valenzuela, L., Mihailescu, R. and Coelli, R. (2022). Australian consumers and environmental characteristics of wine: price premium indications. *International Journal of Wine Business Research*, *34* (4), 542-566. https://doi.org/10.1108/IJWBR-04-2021-0024

[45] Kelkar, V. N., Bolar, K., Payini, V., and Mallya, J. (2023). Modelling lifestyle-based segments of Indian wine consumers using the latent profile analysis approach. *International Journal of Wine Business Research*, *35* (1), 1-24. https://doi.org/10.1108/IJWBR-09-2021-0044

[46] Muñoz, R. M., Fernández, M. V., and Salinero, M. Y. (2019). Assessing consumer behavior in the wine industry and its consequences for wineries: a case study of a Spanish company. *Frontiers in psychology*, *10*, 2491. https://doi.org/10.3389/fpsyg.2019.02491

[47] Rodríguez-Donate, M. C., Romero-Rodríguez, M. E., Cano-Fernández, V. J., and Guirao-Pérez, G. (2019). Analysis of heterogeneity in the preferences of wine consumption. *Wine Economics and Policy*, *8* (1), 69-80. https://doi.org/10.1016/j.wep.2019.02.006

[48] Rossi, M., Vrontis, D., and Thrassou, A. (2012). Wine business in a changing competitive environment–strategic and financial choices of Campania wine firms. *International Journal of. Business and Globalisation*, *8* (1), 112-130. https://doi.org/10.1504/IJBG.2012.043975

[49] Compés, R., Faria, S., Gonçalves, T., Rebelo, J., Pinilla, V., and Simon Elorz, K. (2022). The shock of lockdown on the spending on wine in the Iberian market: The effects of procurement and consumption patterns. *British Food Journal*, *124 (*5), 1622-1640. https://doi.org/10.1108/BFJ-03-2021-0258

[50] Davis, T. J., and Gomez, M. I. (2022). The COVID-19 pandemic, customer satisfaction and sales performance in wine tasting rooms in the Finger Lakes region of New York State. *International Journal of Wine Business Research*, *34* (2), 173-189. https://doi.org/10.1108/IJWBR-02-2021-0011

[51] Rebelo, J., Compés, R., Faria, S., Gonçalves, T., Pinilla, V., and Simón-Elorz, K. (2021). Covid-19 lockdown and wine consumption frequency in Portugal and Spain. *Spanish Journal of Agricultural Research*, *19* (2), e0105R-e0105R. https://doi.org/10.5424/sjar/2021192-17697

[52] Alonso, A., Bressan, A.,Vu, O.T.K.,Ha Do, L.T.,Garibaldi, R. and Pozzi, A.(2022). How consumers relate to wine during COVID-19 – a comparative, two nation study. *International Journal of Wine Business Research*, *34* (4), 590-607. https://doi.org/10.1108/IJWBR-09-2021-0051

[53] Niklas, B., Cardebat, J. M., Back, R. M., Gaeta, D., Pinilla, V., Rebelo, J., .and Schamel, G. (2022). Wine industry perceptions and reactions to the COVID-19 crisis in the Old and New Worlds: Do business models make a difference?. *Agribusiness*, *38*(4), 810-831. https://doi.org/10.1002/agr.21748

[54] Macedo, A., Rebelo, J., and Gouveia, S. (2023). The impact of COVID-19 government policy on the international wine trade. Agricultural and Food Economics, 11(1), 44. https://doi.org/10.1186/s40100-023-00276-5.

[55] Alonso, A. D. (2009). Wine, tourism and experience in the Canary Islands' context. *Tourism: An International Interdisciplinary Journal*, *57 (*1), 7-22.

[56] Lana García-Verdugo, D. (2020). *Diagnóstico de la viticultura en Canarias*. Consejería de Agricultura, Ganadería y Pesca. Gobierno de Canarias.

[57] Ministerio de Agricultura, Pesca y Alimentación (MAPA) (2023) Datos de las denominaciones de Origen Protegidas de vino-DOPs-Campaña 2021/2022. Subdirección General de Control de la Calidad Alimentaria y Laboratorios Agroalimentarios. Madrid.

[58] Instituto Canario de Calidad Agroalimentaria (2009-2010). *Manual del consumidor de vinos de Canarias. 2009-2010*. Gobierno de Canarias.

[59] Ruff, L., Hernández, C. F., Santos, G. G., and Carneiro, (2020). A wine tourism as a means towards economic profitability for the Canary Islands' wine sector: Recommendations for collaboration-based initiatives. Proceedings 2nd International Research workshop on wine Tourism. Challenges and futures perspectives.

[60] Alonso, A., Scherrer, P. and Sheridan, L. (2009). The challenge of preserving rural industries and traditions in ultraperipheral Europe: evidence from the Canary Islands. *Journal of Rural and Community Development*, *4* (2), 1-18. https://doi.org/10.17851/1982-3053.3.5.1

[61] Nuez Yánez, J.S. (2005). Despertares. La vitivinicultura canaria en la segunda mitad del siglo XX. III Congreso de Historia Vitivinícola Uruguaya y I Congreso de Historia Vitivinícola Regional.

[62] Alonso, A. D., and Northcote, J. (2008). Small wine-growers' views on their relationship with local communities. *Journal of Wine Research*, *19* (3), 143-158. https://doi.org/10.1080/09571260902891035

[63] Alonso, A. D., and Liu, Y. (2012). The challenges of the Canary Islands' wine sector and its implications: A longitudinal study. *PASOS Revista de Turismo y Patrimonio Cultural*, *10* (3), 345-355. https://doi.org/10.25145/J.PASOS.2012.10.040

[64] Alonso, A. D., Sheridan, L., and Scherrer, P. (2008 a). Wine tourism in the Canary Islands: An exploratory study. *PASOS Revista de Turismo y Patrimonio Cultural*, *6* (2), 291-300. https://doi.org/10.25145/j.pasos.2008.06.022

[65] Alonso, A. D., Sheridan, L., and Scherrer, P. (2008 b). Importance of tasting rooms for Canary Islands' wineries. *British Food Journal*, *110* (10), 977-988. https://doi.org/10.1108/00070700810906606

[66] Scherrer, P., Alonso, A., and Sheridan, L. (2009). Expanding the destination image: Wine tourism in the Canary Islands. *International journal of tourism research*, *11* (5), 451-463. https://doi.org/10.1002/jtr.713

[67] Sheridan, L., Duarte Alonso, A., and Scherrer, P. (2009). Wine tourism as a development initiative in rural Canary Island communities. *Journal of Enterprising Communities: People and Places in the Global Economy*, *3* (3), 291-305. https://doi.org/10.1108/17506200910982037

[68] Díaz Armas, R., Gutiérrez Taño, D., Hernández Méndez, J., Ramos Henríquez, J. M., Baute Díaz, N., and Sabina del Castillo, E. J. (2020). Hábitos de consumo de vino en Canarias: Frenos e impulsores al consumo de vinos canarios. Servicio de Publicaciones de la Universidad de La Laguna

[69] Romero-Rodríguez, M.E; Rodríguez-Donate, M. C; Cano-Fernández, V. J., and Guirao-Pérez, G. (2021). Exploratory analysis of the differences in wine consumption between generations X and Y. *Estudios de Economía Aplicada*, *39* (8), 28. https://doi.org/10.25115/eea.v39i8.4582

[70] Boone, W. J. (2016). Rasch analysis for instrument development: Why, when, and how?. *CBE—Life Sciences Education*, *15* (4), 1-7. https://doi.org/10.1187/cbe.16-04-0148

[71] Fischer, Arnout R. H., Lynn J. Rewer and Maarten J. and Nauta. (2006). Toward improving food safety in the domestic environment: a multi-item Rasch scale for the measurement of the safety efficacy of domestic food-handling practices. *Risk Analysis, 26* (5), 1323-1338. https://doi.org/10.1111/j.1539-6924.2006.00813.x

[72] García-Pérez, A.M. and Yanes-Estévez, V. (2022). Longitudinal study of perceived environmental uncertainty. An application of Rasch methodology to SMES. *Journal of Advances in Management Research*, *19* (5), 760-780. https://doi.org/10.1108/JAMR-02-2022-0033

[73] Martin, W. L., McKelvie, A., and Lumpkin, G. T. (2016). Centralization and delegation practices in family versus non-family SMEs: a Rasch analysis. *Small Business Economics*, *47*, 755-769. https://doi.org/10.1007/s11187-016-9762-5

[74] Sapiyi, S., Suradi, N.M. and Mustafa, Z. (2021). Construct validity and reliability of creativity and innovation in public sector: a Rasch measurement model approach for pilot study. *Journal of Contemporary Issues in Business and Government, 27* (1), 2779-2792.

[75] Yanes-Estévez, V., García-Pérez, A. M., and Oreja-Rodríguez, J. R. (2018). The strategic behaviour of SMEs. *Administrative Sciences*, *8* (4), 1-21. https://doi.org/10.3390/admsci8040061

[76] Shea, T., Cooper, B. K., De Cieri, H., and Sheehan, C. (2012). Evaluation of a perceived organisational performance scale using Rasch model analysis. *Australian Journal of Management*, *37* (3), 507-522.

[77] Wright, B and Stone, M. (1999). *Measurement Essentials*. Wide Range. Delaware.

[78] Engelhard, G. (1984). Thorndike, Thurstone and Rasch: a comparison of their methods of scaling psychological and educational test. *Applied Psychological Measurement, 8* (1), 21-38. https://doi.org/10.1177/014662168400800104

[79] Andrich, D. (1978). A rating scale formulation for ordered response categories. *Psychometrika,* 43, 561-573. https://doi.org/10.1007/BF02293814

[80] Andrich, D. (1988). *Rasch models for measurement*. Sage Publications. Newbury Park (California).

[81] Linacre, J.M. (2016). Winsteps Rasch Measurement Computer Program Winstepscom Chicago. http://www.winsteps.com/winman/indexhtm (accessed January 2020).

[82] Consejo Económico y Social de Canarias (2021): Informe anual del Consejo Económico y Social de Canarias del año 2020. Consejo Económico y Social de Canarias

[83] Rodon, T. and Guinjoan, M. (2024). ¿Las actitudes frente al cambio climático en España varían con la edad?. El Observatorio Social de la Fundación "La Caixa". Available at https://elobservatoriosocial.fundacionlacaixa.org/es/-/actitudes-frente-al-cambio-climatico-y-edad# (Accessed on 30 April 2024)

[84] Machín, N; Gonzalo, C. and Hontoria, M (2018). *Zonificación agroclimática de la Isla de Tenerife*

orientada a la viticultura. Agrocabildo. Cabildo de Tenerife.

[85] González-Díaz, F. J., González, E. P., Suárez, C. L., Santana, J. L., and Gutiérrez, V. (2006). Caracterización bioclimática del cultivo de la vid en la subzona Anaga en la Denominación de Origen Villa de Güímar en la isla de Tenerife. 2006. VI Jornadas Técnicas de Viticultura de Canarias

[86] Promotur (2021). *Perfil del turista que visita Islas Canarias 2021*. Gobierno de Canarias.

[87] Rodríguez-Donate, M.C., Romero-Rodríguez, M.E., Cano-Fernández, V.J. and Guirao-Pérez, G. (2017). Sociodemographic determinants of the probability of wine consumption in Tenerife (Canary Islands). *International Journal of Wine Business Research*, *29* (3), 316-334. https://doi.org/10.1108/IJWBR-06-2016-0017

[88] Gobierno de Canarias, (2021). *Canarias destino. Estrategia compartida de transformación del modelo turístico canario. El turismo que queremos*. Consejería de turismo, Industria y Comercio. Available at https://turismodeislascanarias.com/sites/default/files/present_planestrategico2026.pdf

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Candeias, T., & Alonso, H. (2024). Measuring price sensitivity to the consumption situation. *Wine Economics and Policy* 13(1): 97-107. doi: 10.36253/wep-15236

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Measuring price sensitivity to the consumption situation

Teresa Candeias[1], Hugo Alonso[1,2,*]

[1] *Lusófona University, Portugal*
[2] *University of Aveiro, Portugal*
Email: teresa.ribeiro.candeias@ulusofona.pt; hugo.alonso@ulusofona.pt
*Corresponding author.

Abstract. Consumer segmentation is very relevant in the design of wine marketing strategies. Previous studies showed that there is a relationship between the consumption situation and the willingness to pay for a bottle of wine. In this sense, the consumption situation is considered a segmentation variable. However, price sensitivity in relation to the consumption occasion was not measured. In this paper, we propose four measures of price sensitivity to the consumption occasion. We illustrate how to compute them and discuss their advantages and limitations. One of the measures only discriminates consumers that are sensitive to the consumption occasion from those who are not. In turn, the other measures are more informative and make it possible to distinguish between different degrees of sensitivity. The proposed measures can be used to classify consumers and further improve the knowledge of wine marketeers and decision makers in the wine industry about them.

Keywords: wine, consumption situation, willingness to pay, sensitivity measure.

1. INTRODUCTION

The consumption situation is an issue of interest for both academics and non-academics. In consumer behavior research, the importance of the consumption situation in the purchase decision process is recognized. Understanding such process is particularly relevant in the wine area, given the diversity of wine markets and the wide range of choices available to the consumer. In this context, Bruwer et al. [1] consider pertinent the adoption of segmentation methodologies in order to better analyze consumer behavior. Wine marketing theory portrays wine as a product possessing a set of cues that aim to satisfy consumer needs [2]. Lockshin and Hall [3] identify a set of attributes that motivate the wine choice, such as brand, country of origin, grape variety, winemaker's name, vintage, alcohol content, taste and packaging, but also price. However, Belk [4] questions the reliability of research results on consumer behavior that do not take into consideration the effect of the consumption situation. In the same line, Quester and Smart [5] state that studying market segmentation by consumption situations may allow

the reduction of the companies' target, leading to more assertive and profitable decision-making. Thus, for each consumption situation, the most valued attributes may be described, providing preponderant information that allows companies to define the segments in which they intend to operate [6,7]. According to Barber et al. [8], the recognition of new wine consumption occasions is a relevant topic in wine marketing research. Furthermore, Hall and Lockshin [9] stress the importance of the relationship between price and the situation in which the consumer intends to drink wine. Several studies suggest that price constitutes a discriminant variable in different consumption situations [10-12].

This work aims to study the influence of the consumption situation on the purchase decision, more specifically, on the willingness to pay. For this purpose, we introduce several ways to measure consumers' sensitivity in willingness to pay for a bottle of wine in different consumption situations. Our measures of sensitivity can be used to characterize and segment consumers, providing new and relevant knowledge about consumer behavior in different consumption situations.

After this brief introduction, a literature review is given, where the importance and impact of the consumption situation in wine consumer behavior and willingness to pay for a bottle are detailed. Subsequently, we present the main contribution of this paper: different measures of price sensitivity to the consumption occasion. We exemplify how to calculate them and discuss their advantages and disadvantages. Finally, we end with the conclusions and some suggestions for further research.

2. LITERATURE REVIEW

The volatility of the markets, changes in consumer behavior and the increasing number of players operating in the wine industry have made the market more demanding. Wine is identified as a product of multiple attributes, such as packaging, label, brand, price, region, grape variety, alcohol percentage and taste, among other. Its evaluation is a complex task and, for many consumers, choosing a wine appropriate for a specific occasion can be a complicated challenge. In this context, understanding the consumption habits and needs of consumers is crucial to design an effective marketing strategy. Given the diversity of wine markets, several authors mention the importance of adopting segmentation methodologies to analyze and understand wine consumer behavior [1,13,14]. Segmentation enables the division of markets that can be reached with different marketing tools [15]. Kotler et al. [16] identify classical marketing segmentation variables such as geographic, demographic, psychographic and behavioral. Thach and Olsen [17] propose a segmentation based on lifestyle with the purpose of highlighting motivations and consumption occasions. Naturally, the consumption situation plays a preponderant role in the definition of market strategies [18]. Market strategies are intricately linked with consumption situations as they are crafted to comprehensively grasp, shape and adjust to consumer behaviors and preferences [19]. This alignment is crucial for stimulating consumption and accomplishing business objectives effectively. By understanding the nuances of different consumption situations, such as social gatherings, special occasions or everyday consumption, marketeers can tailor their strategies to resonate with consumers' needs, desires and motivations. This approach allows companies to deliver targeted messages, products and experiences that enhance consumer engagement and drive sales. Ultimately, aligning market strategies with consumption situations enables businesses to build stronger relationships with their target audience, foster brand loyalty and achieve sustainable growth in a competitive marketplace [16]. According to this reference, the consumption situation is particularly relevant, because it can affect the link between purchase intention and purchase decision, so personal preference and purchase intention are not themselves absolute signals of buying behavior. In essence, purchase intention and purchase decision are interrelated stages within the consumer decision-making process. Purchase intention precedes the purchase decision, acting as a preliminary indicator of the consumer's inclination or readiness to buy. Subsequently, this intention significantly influences the eventual purchase decision and its outcome. Belk [4] refers the relevance of situational factors in consumer behavior for marketing, considering that understanding the effect of the consumption situation in conjunction with the knowledge of an individual consumer stands as an important basis for fine-tuned marketing efforts. Situational factors encompass the environmental or contextual elements that have the potential to influence an individual's behavior or decision-making process within a specific situation. These factors are often temporary and can fluctuate depending on the circumstances surrounding that particular moment. Situational factors play a significant role in shaping consumer behavior and decision-making by directly influencing perceptions, motivations and choices within those specific instances [4]. In the same sense, Bonner [20] considers that the consumption situation affects the consumer's decision-making structure in the purchase process. Therefore,

in addition to recognizing the triggers arising from the effect of the consumption situation in relation to the products and the buying situation, it is necessary to differentiate the consumption situation. Thus, it is important to understand the concept of consumption situation, which is defined by Belk [4] as "all those factors particular to a time and place of observation which do not follow from a knowledge of personal (intra-individual) and stimulus (choice alternative) attributes, and which have a demonstrable and systematic effect on current behavior" (p. 157). A variety of studies have addressed the prediction of demand behavior, particularly when analyzed with individual characteristics, and have found evidence on the role of the consumption situation in explaining consumer decision-making [20-23]. In the wine sector, consumers buy wine for a wide range of situations ranging from buying wine for consumption at home to buying wine for special occasions such as a dinner at home with friends, a celebration or a gift. The studies of Aqueveque [6] and Hall et al. [7] suggest that, on different consumption occasions, the same consumer may have different choices according to the consumption situation for which the wine is intended. Along the same line, several authors have collected evidence supporting the hypothesis that wine purchase and consumption are significantly influenced by the purchase and consumption situation [9,24-26]. Lockshin and Hall [3] present a thorough analysis of the causes that marketing studies recognize as being decisive in choice, in order to highlight the complexity of wine consumption. From this perspective, the consumption situation is seen as the scenario in which consumption occurs, having the ability to change the intensity with which product attributes are perceived. The intensity of perception for product attributes reveals the degree or strength of how consumers perceive the different characteristics or features of a product. This concept is fundamental in understanding consumer behavior and decision-making processes. It profoundly influences purchase decisions, marketing strategies, product development efforts and overall business success. The study by Quester and Smart [5] is a reference in this regard. The results obtained suggest that the attributes that consumers value when buying wine change according to the situation. This means that attributes such as grape variety, region of origin or price have a different impact on the purchase decision depending on the consumption situation for which the wine is intended. Likewise, Fountain and Lamb [27] address consumption occasions as contexts of choice and highlight the influence of age on wine preferences. Wine consumer behavior regarding the preferences expressed in relation to different consumption occasions calls for a change in the marketing and advertising strategy [28].

As noted earlier, wine is a multi-attribute product, whose evaluation occurs during consumption. The ability to evaluate quality before purchase is asymmetric and consumers will tend to rely on extrinsic attributes to measure wine quality [29]. This asymmetry arises from several factors (ex: informational imbalance; complexity of products or services; subjectivity of quality; lack of expertise). The asymmetry in the ability to evaluate quality before purchase underscores the importance of transparency, consumer education and trust-building measures by sellers to mitigate uncertainties and enhance consumer confidence in their purchasing decisions [30]. The consumption occasion can amplify the issues of asymmetry in quality assessment, making it even more important for sellers to provide clear and transparent information about their products or services and establish consumer trust. In many consumption situations, consumers face time pressures, social influences and heightened expectations, which can hinder a comprehensive evaluation of product or service quality. Therefore, providing accurate and transparent information, along with building trust relationships with consumers, is crucial to mitigate information asymmetry and promote an informed and satisfactory purchasing decision. Consumers rely on intrinsic and extrinsic wine attributes to decide which wine to buy. Intrinsic cues encompass the inherent characteristics of the wine itself, comprising its taste profile, aroma and body. These cues stem directly from the sensory encounter with the wine and are fundamental in shaping consumers' evaluations and preferences. For example, factors such as the perceived complexity of flavors, the equilibrium between acidity and sweetness or the duration of the finish are all intrinsic cues that consumers take into account when assessing a wine. In opposition, extrinsic cues relate to external factors surrounding the wine, such as its price, brand reputation, packaging and labelling. While intrinsic cues focus on the inherent qualities of the product, extrinsic cues offer contextual information. From the set of extrinsic attributes, price is generally regarded as a relevant indicator of wine quality. In this sense, Spawton [2] states that price is an instrument to reduce the perception of risk in the purchase act, defining it as the amount the consumer is willing to pay for the perceived value of the product. Naturally, the price has a relevant impact on the perception of wine quality in cases where there are few cues available, in cases where it is impossible to evaluate the product or when there is a high perceived risk of making a wrong choice [31,2]. The relationship between wine quality and price makes it pos-

sible to establish the reasons for and extent of the purchase decision, evaluate the gap between different price ranges (minimum/maximum) as a function of the levels of perceived quality that consumers attribute to it, forming a relevant signal of potential demand [32]. Therefore, the theme of creating value for the consumer becomes essential for marketeers. Another aspect to take into account is the fact that some consumers show greater vulnerability to the social environment and, for this reason, guide their purchasing decisions based on the perception they will create in others. Thus, consumers seek to make purchase decisions that give them positive attributes [33]. Under these circumstances, consumers may be less apprehensive about price in social consumption environments given the reference group effect and the social evaluation arising from the purchase decision. In the wine market, the estimation of consumer valuation, that is, the process by which consumers assign a perceived worth or value to a product or service based on their individual preferences, needs and perceptions [34], is done based on two methodologies: the hedonic price analysis [35], which aims to establish a relationship between the price of a distinct product and its characteristics, and the estimation of willingness to pay [36-42], which has the purpose of determining the maximum price at which a consumer will certainly buy one unit of a product. Hall and Lockshin [9] recognize the importance of the relationship between price and the situation in which the consumer intends to drink the wine. A study by Orth [43] recognizes that the choice of brand and the benefits sought in a wine change according to three situations: self-consumption, receiving friends or giving as a gift. According to Stöckl [44], the preponderance of such circumstances can range from high to none, varying according to the situation/occasion. Actually, in the case of buying wine for consumption, a low price can have a significant impact on the purchase decision, but in the case of buying wine for a gift, the price has little impact [10]. Corroborating this, Yu et al. [11] suggest that price is a discriminating attribute and conclude that consumers are willing to pay higher prices for wine purchased as a gift.

The effect of wine consumption situations on the purchase decision and, more specifically, the willingness to pay a certain price for wine remains a topic of interest [12]. Segmentation according to consumption situations and the respective price sensitivity is a relevant indicator in the definition of a marketing strategy [45]. In this context, this study aims to measure the consumers' price sensitivity according to different consumption situations. The ability to measure this indicator will enable companies to segment consumers according to their sensitivity and characterize them to make the marketing strategy more assertive. The development of effective marketing strategies remains paramount for organizations striving to achieve sustainable growth and competitive advantage in today's dynamic business landscape [16]. These strategies serve as foundational frameworks, guiding organizations in identifying target markets, understanding consumer needs and positioning products or services effectively [16]. By leveraging market research and consumer insights, organizations can formulate tailored strategies that resonate with their audience and differentiate their offerings from competitors [46]. Successful marketing strategies facilitate brand building, customer acquisition and retention, ultimately driving revenue growth and profitability [47]. They also enable efficient resource allocation, optimization of marketing investments and adaptation to changing market trends. Ultimately, strategic marketing initiatives foster long-term customer relationships, enhance brand equity and establish a strong market presence, contributing to sustained organizational performance and competitiveness [47].

3. MEASURING PRICE SENSITIVITY TO THE CONSUMPTION OCCASION

3.1. Preliminaries

Suppose that consumers are faced with the problem of deciding how much to pay for a certain product, depending on the consumption occasion. Assume that there are $L \in \{2,3,\ldots\}$ consumption occasions and $K \in \{2,3,\ldots\}$ price intervals, $I_1,\ldots,I_K$, such that

$$I_i < I_{i+1} \text{ for } i=1,\ldots,K\text{-}1, \tag{1}$$

which means that every element of I_i is less than all elements of I_{i+1}, and

$$\cup^{K}_{i=1} I_i = [0,+\infty[. \tag{2}$$

Each consumer chooses a price interval for each consumption occasion. Hence, if P_l denotes the price interval for the l-th consumption occasion, then P_l is an ordinal variable with values $I_1,\ldots,I_K$. We code these values numerically, representing the price interval I_k by the integer k. Therefore, writing $P_l=I_k$ and $P_l=k$ amounts to the same. Considering all L consumption occasions, each individual indicates an ordered sequence of price intervals $(P_1,\ldots,P_L)$, where $P_l \in \{1,\ldots,K\}$ for $l=1,\ldots,L$.

As an example, suppose that consumers are faced with the problem of evaluating and deciding how much to pay for a bottle of wine to drink at home and at a res-

taurant. In this case, we have L=2 consumption occasions. Furthermore, assume that there are K=3 price intervals, I_1=[0,10[, I_2=[10,20[and I_3=[20,+∞[euro. It is clear that these intervals satisfy conditions (1) and (2). Now, note that, for instance, a consumer may indicate (P_1,P_2)=(1,1) and another one (P_1,P_2)=(2,3), *i.e.*, the first consumer may choose the same price interval, I_1, in the two consumption occasions, while the second consumer may choose I_2 in the first occasion and I_3 in the second one.

3.2. Measures of price sensitivity to the consumption occasion

In the section, we will introduce four ways to measure price sensitivity to the consumption occasion. They will be represented by functions $S_1,\ldots,S_4$ of $(P_1,\ldots,P_L)$, *i.e.*, $S_i=S_i(P_1,\ldots,P_L)$ for i=1,…,4. In order to illustrate the computation and facilitate the comparison of these measures, we shall consider the data in Table 1, referring to a sample of eleven hypothetical consumers, L=6 consumption occasions and K=5 price intervals.

3.2.1. First sensitivity measure

Our first sensitivity measure, denoted by S_1, is inspired by the way how the authors of [48] distinguish between loyal and nonloyal purchases. They consider that a consumer is loyal to a brand if he/she buys that brand in more than 50% of the purchase occasions and nonloyal otherwise. As remarked by the authors, the threshold of 50% can be adjusted to a different, suitable value, like 60% or 70%. In this context, we consider that a consumer is loyal to a price interval if he/she chooses that price interval in more than 50% of the consumption occasions and nonloyal otherwise. Furthermore, we consider that a consumer is insensitive to the consumption occasion if he/she is loyal to a price interval and sensitive otherwise.

Formally, given an ordered sequence of price intervals $(P_1,\ldots,P_L)$, where $P_l\in\{1,\ldots,K\}$ for l=1,…,L, assume that value 1 has a relative frequency f_1 in the L consumption occasions, etc., until value K with a relative frequency f_K. Let

$$f_{\max}=\max\{f_1,\ldots,f_K\}. \tag{3}$$

Then, the sensitivity measure is defined as

$$S_1=\begin{cases}0 & \text{if } f_{\max}>50\%\\ 1 & \text{otherwise}\end{cases}. \tag{4}$$

Table 1. Price choices on L=6 consumption occasions by eleven hypothetical consumers. K=5 price intervals are considered. Also shown are the values of four measures of price sensitivity to the consumption occasion.

Consumer	P_1	P_2	P_3	P_4	P_5	P_6	S_1	S_2	S_3	S_4
1	1	1	1	1	1	1	0	0	0	0
2	1	1	1	1	1	3	0	0.25	0.139	0.062
3	1	1	1	3	3	3	1	0.25	0.25	0.111
4	1	1	1	4	4	4	1	0.25	0.563	0.25
5	1	1	1	5	5	5	1	0.25	1	0.444
6	1	1	1	4	5	5	1	0.5	0.868	0.772
7	3	4	4	4	5	5	1	0.5	0.118	0.105
8	1	2	4	4	5	5	1	0.75	0.563	0.75
9	1	1	2	4	5	5	1	0.75	0.75	1
10	1	2	3	4	5	5	1	1	0.556	0.988
11	1	2	3	3	4	5	1	1	0.417	0.741

In the first case, the price the consumer is willing to pay for the product is considered insensitive to the consumption occasion; in the second case, it is classified as sensitive.

As an example, for the second consumer in Table 1, we have $(P_1,P_2,P_3,P_4,P_5,P_6)$=(1,1,1,1,1,3). Hence, f_1=5/6≈83%, f_3=1/6≈17% and $f_2=f_4=f_5$=0%. Since $f_{\max}$=5/6≈83%>50%, it follows that S_1=0, *i.e.*, the price is considered insensitive to the consumption occasion. In turn, for the eighth consumer in the same table, we have $(P_1,P_2,P_3,P_4,P_5,P_6)$=(1,2,4,4,5,5). In this case, $f_1=f_2$=1/6≈17%, $f_4=f_5$=2/6≈33% and f_3=0%. Since $f_{\max}$=2/6≈33%≤50%, it follows that S_1=1, *i.e.*, the price is classified as being sensitive to the consumption occasion.

This first measure of price sensitivity to the consumption occasion is limited, because it only discriminates consumers that are sensitive to the consumption occasion from those who are not. The next measures are more informative, since they make it possible to distinguish between different degrees of sensitivity.

3.2.2. Second sensitivity measure

Our second sensitivity measure is denoted by S_2. Given an ordered sequence of price intervals $(P_1,\ldots,P_L)$, where $P_l\in\{1,\ldots,K\}$ for l=1,…,L, let $N(P_1,\ldots,P_L)$ represent the number of different values in $(P_1,\ldots,P_L)$. It can be seen that the maximum value of $N(P_1,\ldots,P_L)$ is

$$N_{\max}=\min\{L,K\}. \tag{5}$$

In fact, if the number of consumption occasions, L, is less than the number of possible price intervals,

K, that is, $L<K$, then $N_{max}=L$. Otherwise, if $L\geq K$, then $N_{max}=K$. Now, we define

$$S_2 = \frac{N(P_1, \ldots, P_L) - 1}{N_{max} - 1}. \quad (6)$$

Given that $N(P_1,\ldots,P_L)\in\{1,\ldots,N_{max}\}$, the value of S_2 is always between 0 and 1. Note that, if a consumer chooses the same price interval in all consumption occasions, then all values in $(P_1,\ldots,P_L)$ are equal, $N(P_1,\ldots,P_L)=1$ and $S_2=0$, *i.e.*, the price to pay for the product is considered insensitive to the consumption occasion. In turn, if a consumer chooses the price intervals in such a way that the number of different values in $(P_1,\ldots,P_L)$ is the maximum possible, N_{max}, then $S_2=1$, *i.e.*, the sensitivity of the price to the consumption occasion is considered to be the maximum possible. Finally, it is worthwhile to remark that the value of S_2 increases with an increase in the value of $N(P_1,\ldots,P_L)$, *i.e.*, the higher the number of different values in $(P_1,\ldots,P_L)$, the higher the value of S_2, *i.e.*, the more sensitive the price to the consumption occasion.

As an example, consider the data in Table 1. Since $L=6$ and $K=5$, it follows that $N_{max}=5$. For the fifth consumer, we have $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,5,5,5)$. Hence, $N(P_1,P_2,P_3,P_4,P_5,P_6)=2$ and $S_2=(2\text{-}1)/(5\text{-}1)=0.25$. In turn, for the ninth consumer, we have $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,2,4,5,5)$. In this case, $N(P_1,P_2,P_3,P_4,P_5,P_6)=4$ and $S_2=(4\text{-}1)/(5\text{-}1)=0.75$. Therefore, the latter consumer, with a higher value of S_2, is considered more sensitive, because he/she chooses a higher number of different price intervals in the same consumption occasions.

This second measure of price sensitivity to the consumption occasion not only discriminates consumers that are sensitive to the consumption occasion from those who are not, but also enables to distinguish between different degrees of sensitivity. Therefore, it is obviously more informative than the first one. In spite of this, we think it is not completely adequate, as explained next. Take the third and the fifth consumers, for whom $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,3,3,3)$ and $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,5,5,5)$, respectively. They have the same S_2 value, namely, 0.25, *i.e.*, according to this measure, they are considered equally sensitive. However, the price intervals chosen by the third consumer are closer to each other than those chosen by the fifth consumer, since interval 1 is closer to interval 3 than to interval 5 (remember from (1) that $I_1<I_2<I_3<I_4<I_5$). In this context, we feel that the third consumer should be considered less sensitive. This is the outcome if we apply the next two sensitivity measures.

3.2.3. Third sensitivity measure

Our third sensitivity measure is denoted by S_3. Given an ordered sequence of price intervals $(P_1,\ldots,P_L)$, where $P_l\in\{1,\ldots,K\}$ for $l=1,\ldots,L$, let

$$\overline{P} = \frac{1}{L}\sum_{\ell=1}^{L} P_\ell \quad (7)$$

represent the average of the integers used to code the intervals. Consider the sum of squares

$$SS(P_1, \ldots, P_L) = \sum_{\ell=1}^{L}\left(P_\ell - \overline{P}\right)^2, \quad (8)$$

whose maximum value

$$SS_{max} = \frac{(K-1)^2}{4} \times \begin{cases} L & \text{if } L \text{ is even} \\ \left(L - \frac{1}{L}\right) & \text{if } L \text{ is odd} \end{cases} \quad (9)$$

can be obtained from Popoviciu's inequality (see, for instance, [49] and references therein). Then, we take

$$S_3 = \frac{SS(P_1, \ldots, P_L)}{SS_{max}}. \quad (10)$$

Note that the value of S_3 corresponds to the value of the variance of the integers used to code the price intervals, normalized to the interval [0, 1]. Therefore, the higher the variability of the price intervals about the average price interval, the higher the value of S_3. It is obvious that $S_3=0$ when there is no variability and $S_3=1$ when there is maximum variability.

As an example, consider the data in Table 1. Since $L=6$ is even and $K=5$, it follows that $S_{max}=(5\text{-}1)^2/4\times 6=24$. For the third and the fifth consumers, we have $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,3,3,3)$ and $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,5,5,5)$, respectively. In the former case, the average price interval is $\overline{P}=2$, the sum of squares is $SS(P_1,P_2,P_3,P_4,P_5,P_6)=6$ and $S_3=6/24=0.25$. For the latter case, $\overline{P}=3$, $SS(P_1,P_2,P_3,P_4,P_5,P_6)=24$ and $S_3=24/24=1$. Hence, according to S_3, the third consumer is considered less sensitive than the fifth one and this happens because the variability of the price intervals is lower in the first case. We feel that this conclusion is more adequate than the one based on the values of the previous sensitivity measures, S_1 and S_2, which are the same for the two consumers, and, therefore, suggest that the two are equally sensitive.

Now, let's compare the choices of the fifth consumer, $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,5,5,5)$, with the choices of the eighth one, $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,2,4,5,5)$. The average price interval is the same in both cases, but the variability about the average is greater in the first case, leading to a higher value of S_3. In turn, the number of different price intervals in the same consumption occasions is greater in the second case, leading to a higher value of S_2. Both S_2 and S_3 are informative. They provide different information about the consumers and thus complement each other. This motivated us to consider a measure which combines the information of both. It is described in the next subsection.

3.2.4. Fourth sensitivity measure

Our fourth sensitivity measure is denoted by S_4 and combines the information given by the second measure, S_2, defined in (6), with the one given by the third measure, S_3, defined in (10). Given an ordered sequence of price intervals $(P_1,\ldots,P_L)$, where $P_l\in\{1,\ldots,K\}$ for $l=1,\ldots,L$, we take

$$S_4=\frac{S_2\times S_3}{M_{\max}}, \tag{11}$$

where $M_{\max}$ is the maximum value of $S_2\times S_3$. It is obvious that the value of S_4 is always in $[0,1]$ and that it increases with S_2, for a fixed S_3, and with S_3, for a fixed S_2. Next, we explain how to obtain $M_{\max}$.

When $L=2$ or $K=2$, we have $M_{\max}=1$. First of all, remark that

$$S_2\times S_3\leq 1, \tag{12}$$

since $S_2\leq 1$ and $S_3\leq 1$. When $L=2$ or K=2, this upper bound on $S_2\times S_3$ is attainable, *i.e.*, the maximum value of $S_2\times S_3$ is given by $M_{\max}=1$. Note that the sum of squares $SS(P_1,\ldots,P_L)$ in S_3, given by (8), attains its maximum value $SS_{\max}$, given by (9), in the following conditions [49]: if L is even, when $L/2$ of the P_l are equal to 1 and the other $L/2$ to K; if L is odd, when $(L\text{-}1)/2$ of the P_l are equal to 1 and the other $(L+1)/2$ to K or vice versa. Hence, $SS(P_1,\ldots,P_L)$ attains its maximum value $SS_{\max}$ and $S_3=1$ when there are only two different values in $(P_1,\ldots,P_L)$, *i.e.*, when $N(P_1,\ldots,P_L)=2$. In this context, $N(P_1,\ldots,P_L)$ attains its maximum value $N_{\max}$, given by (5), and $S_2=1$ if $N_{\max}=2$ and, since $N_{\max}=\min\{L,K\}$, this means having $L=2$ or $K=2$.

For $L>2$ and $K>2$, we have no explicit formula to compute $M_{\max}$ and we propose two ways to obtain it. In both ways, we explore the fact that the value of $S_2\times S_3$ as a function of $(P_1,\ldots,P_L)$ is the same for all possible permutations of $(P_1,\ldots,P_L)$, because the value of S_2 and S_3 does not change with a change in the order of the price intervals considered. Therefore, instead of searching for the maximum value of $S_2\times S_3$ in all K^L possible values of $(P_1,\ldots,P_L)$, it suffices to search in all values of $(P_1,\ldots,P_L)$ such that $P_l\leq P_{l+1}$ for $l=1,\ldots,L\text{-}1$. Note that the number of values of $(P_1,\ldots,P_L)$ in the previous conditions equals the number of multisets of length L using K symbols, called L multichoose K, which is represented by

$$\left(\binom{K}{L}\right) \tag{13}$$

and is given in terms of the binomial coefficient by

$$\left(\binom{K}{L}\right)=\binom{K+L-1}{L}=\frac{(K+L-1)!}{L!\,(K-1)!}, \tag{14}$$

where the exclamation mark stands for factorial [50]. For instance, there are $\left(\binom{3}{3}\right)=10$ multisets of length 3 using 3 symbols, say 1, 2 and 3:

1 1 1
1 1 2
1 1 3
1 2 2
1 2 3
1 3 3
2 2 2
2 2 3
2 3 3
3 3 3

If the number of consumption occasions, L, and the number of price intervals, K, is not very high, which is, in general, the case in practice, all multisets of length L occasions using K price intervals can be generated using any appropriate software, like Matlab. In this context, the value of $S_2\times S_3$ can be computed in all of the multisets and the maximum value $M_{\max}$ can be obtained. This is our first approach to get $M_{\max}$. It is an exhaustive search method and should be applied only when L and K are not very high. Our second approach consists in using an appropriate software, like Matlab, to solve the nonlinear integer problem with linear restrictions

$$\begin{aligned}\max_{(P_1,\ldots,P_L)}\quad & S_2\times S_3\\ \text{subject to}\quad & P_\ell\leq P_{\ell+1}\quad \ell=1,\ldots,L-1\\ & P_\ell\in\{1,\ldots,K\}\quad \ell=1,\ldots,L\end{aligned}$$

Table 2. Maximum value of $S_2 \times S_3$ as a function of $L,K \in \{2,\ldots,10\}$.

M_{max}		K								
		2	3	4	5	6	7	8	9	10
	2	1	1	1	1	1	1	1	1	1
	3	1	3/4	7/9	13/16	21/25	31/36	43/49	57/64	73/81
	4	1	11/16	5/9	5/8	17/25	13/18	37/49	25/32	65/81
	5	1	5/6	17/27	25/48	43/75	67/108	97/147	133/192	175/243
L	6	1	29/36	19/27	9/16	548/1125	212/405	83/147	29/48	155/243
	7	1	7/8	20/27	21/32	208/375	157/324	65/126	1255/2304	139/243
	8	1	55/64	7/9	43/64	3/5	115/216	165/343	225/448	113/216
	9	1	9/10	4/5	117/160	16/25	23/40	894/1715	1227/2560	1/2
	10	1	89/100	37/45	37/50	17/25	541/900	4656/8575	161/320	343/729

Table 2 gives the value of M_{max} as a function of $L,K \in \{2,\ldots,10\}$. It was obtained using our two approaches, with the same results. We provide this table so that the reader can know the value of M_{max} for values of L and K that are likely to be considered in practice, without having to compute it.

As an example, consider the data in Table 1. Let us compare the fourth consumer with the eighth one. The value of S_3 is the same in both cases, but the value of S_2 is higher in the latter. Therefore, the value of S_4 is also higher in the latter. In turn, when we compare the sixth consumer with the seventh one, we see that the value of S_2 is the same in both cases, but the value of S_3 is higher in the former. Hence, the value of S_4 is also higher in the former. Now, note that, since L=6 and K=5, it follows that M_{max}=9/16 (see Table 2). For the fifth consumer, we have $(P_1,P_2,P_3,P_4,P_5,P_6)=(1,1,1,5,5,5)$, S_2=0.25, S_3=1 and $S_4=(0.25\times1)/(9/16)\approx0.444$. Therefore, the consumer is considered one of the least sensitive according to S_2, the most sensitive according to S_3 and reasonably sensitive according to S_4. As expected, the conclusion obtained with S_4 is more balanced, because S_4 is a combination of S_2 and S_3.

In summary, following all discussions presented in this subsection and previous ones, we consider S_4 more complete and adequate than S_2 and S_3 alone.

4. CONCLUSIONS AND FUTURE WORK

Wine consumers are always faced with the problem of deciding how much to pay for a bottle of wine, depending on whether they are going to drink it at home with family, at a restaurant with friends or in another context.

In this paper, we introduced and compared four measures of price sensitivity to the consumption occasion. The first measure only discriminates consumers that are sensitive to the consumption occasion from those who are not. In turn, the other measures make it possible to distinguish between different degrees of sensitivity. The second measure and the third one provide different information about consumer behavior. The fourth and last measure is a combination of the previous two and, in our opinion, it is the most informative.

All measures can be used to segment consumers according to their sensitivity to the consumption occasion. Therefore, we plan to use them in the future as segmentation variables. Analyzing price sensitivity data across consumer segments enables marketeers to recognize groups exhibiting diverse purchasing behaviors and preferences. These insights collected from segmentation can enable the customization of marketing strategies, pricing structures and promotions to effectively target each segment. For instance, identifying a segment of price-sensitive consumers who prioritize value for money allows to obtain information on the development of budget-friendly wine options or promotional offers. Through the evaluation of the impact of consumption occasions on willingness to pay, marketing professionals can refine pricing strategies to increase revenue and profitability. By assessing price sensitivity across a spectrum of wine consumption occasions, including social gatherings, celebrations or everyday consumption, marketeers can assemble valuable insights into the degrees of sensitivity to price across diverse contexts. Furthermore, insights obtained from measuring price sensitivity across different consumption occasions can shape marketing communication strategies aimed at effectively expressing value propositions to consumers. For example, in marketing campaigns targeted at consumers who have shown to be price-sensitive due to the consumption occasion, messages emphasizing value, such as discounts, promotions or affordability, can be highlighted.

In the future, we also plan to carry out an empirical statistical study to answer this research question: how do our measures of sensitivity relate to consumers' characteristics, such as gender, age and income? Hence, we need to develop a questionnaire and apply it to a representative sample of individuals, where we can collect data corresponding to the aforementioned consumers' characteristics and to how much they are willing to pay for a bottle of wine in different occasions, so that we can calculate our measures of sensitivity.

It should be stressed that our measures can also be considered for other products, besides wine. Therefore, as another future research endeavor, it would be interesting to know what would be the results if we decided to use our measures for other markets and products.

Finally, as limitations, we identify the possibility of response bias, that is, participants in such studies may provide biased responses influenced by their perception of what is socially acceptable or desirable, rather than their true opinions or behaviors. Furthermore, it is important to note that cultural differences may influence perceptions and behaviors regarding price and product consumption, making it important to consider culture as a control or moderating variable in cross-cultural studies.

ACKNOWLEDGEMENTS

This work was partially supported by the Center for Research and Development in Mathematics and Applications (CIDMA) through the Portuguese Foundation for Science and Technology (FCT – Fundação para a Ciência e a Tecnologia), references UIDB/04106/2020 (https://doi.org/10.54499/UIDB/04106/2020) and UIDP/04106/2020 (https://doi.org/10.54499/UIDP/04106/2020).

REFERENCES

[1] Bruwer, J., Li, E. and Reid, M. Segmentation of the Australian wine market using a wine-related lifestyle approach. Journal of Wine Research. 2002; 13(3), 217-242.

[2] Spawton, A. L. Of wine and live access: An introduction to the wine economy and state of wine marketing. European Journal of Wine Marketing. 1991; 25 (3), 1- 48.

[3] Lockshin, L. and Hall, J. Consumer purchasing behavior for wine: what we know and where we are going. Paper presented at the International Wine Marketing Colloquium, Adelaide. 2003.

[4] Belk, R. W. An exploratory assessment of situational effects in buyer behavior. Journal of marketing research. 1974; 11(2), 156-163.

[5] Quester, P. and Smart, J. G. The influence of consumption situation and product involvement over consumers' use of product attributes. Journal of Consumer Marketing. 1998; 15(3), 220-38.

[6] Aqueveque, C. Extrinsic cues and perceived risk: the influence of consumption situation. Journal of Consumer Marketing. 2006; 23(5), 237-247.

[7] Hall, J., Lockshin, L. and O'Mahony, G. B. Exploring the links between wine choice and dining occasions: Factors of influence. International journal of wine marketing. 2001; 13(1), 36-53.

[8] Barber, N., Taylor, D.C. and Dodd, T.H. The importance of wine bottle closures in retail purchase decisions of consumers. Journal of Hospitality Marketing and Management. 2009; 18(6), 597-614.

[9] Hall, J. and Lockshin, L. Understanding Wine Purchasing. It's not the Consumer, It's the Occasion. Australian & New Zealand Wine Industry. 1999; 14(3), 69-78.

[10] Cholette, S. and Castaldi, R. Analyzing the US retail wine market using price and consumer segmentation models (refereed). Paper presented at the International Wine Marketing Symposium, San Francisco. 2005.

[11] Yu, Y., Sun, H., Goodman, S., Chen, S. and Ma, H. Chinese choices: a survey of wine consumers in Beijing. International Journal of Wine Business Research. 2009; 21(2), 155-168.

[12] Roe, D. and Bruwer, J. Self-concept, product involvement and consumption occasions: Exploring fine wine consumer behavior. British Food Journal. 2017;119(6), 1362-1377.

[13] Thach, E. C. and Olsen, J. E. Market segment analysis to target young adult wine drinkers. Agribusiness. 2006; 22 (3), 307–322.

[14] Kolyesnikova, N., Dodd, T. H. and Duhan, D. F. Consumer Attitudes towards Local Wines in an Emerging Region: A Segmentation Approach. International Journal of Wine Business Research. 2008; 20, 321-334.

[15] Rouzet, E. and Seguin, G. ll marketing del vino. Il mercato. Le strategie commerciali. La distribuzione. Bologna, Italia: Il Sole 24 OREEdagricole. 2004.

[16] Kotler, P., Keller, K., Brady, M., Goodman, M. and Hansen, T. Marketing Management. 4th European Edition. Pearson. 2019.

[17] Thach, E. C. and Olsen, J. E. The search for new wine consumers: Marketing focus on consumer

lifeStyle or lifeCycle? International Journal of Wine Marketing. 2005; 16, 44-57.
[18] Lai, A.W. Consumption situation and product knowledge in the adoption of a new product. European Journal of Marketing. 1991; 25(10), 55-67.
[19] Babin, B. J., and Harris, E. G. CB Consumer Behaviour. Cengage Canada. 2023.
[20] Bonner, P. Considerations for situational research. Advances in Consumer Research. 1985; 12(1), 368-73.
[21] Hornik, J. Situational effects on the consumption of time. Journal of Marketing. 1982; 46(4), 44-55.
[22] Chow, S., Celsi, R. L. and Abel, R. The effects of situational and intrinsic sources of personal relevance on brand choice decisions. Advances in Consumer Research. 1990; 17(1), 755-60.
[23] Dubow, J. S. Occasion-based vs. user-based benefit segmentation: a case study. Journal of Advertising Research. 1992; 32(2), 11-18.
[24] Boncinelli, F., Dominici, A., Gerini, F. and Marone, E. Consumers wine preferences according to purchase occasion: Personal consumption and gift-giving. Food quality and preference. 2019; 71, 270-278.
[25] Bauman, M.J., Velikova, N., Dodd, T. and Blankenship, T. Generational differences in risk perception and situational uses of wine information sources. International Journal of Wine Business Research. 2020; 32(2), 247-265.
[26] Aqueveque, C. Consumers' preferences for low-priced wines' packaging alternatives: the influence of consumption occasion, gender, and age. British Food Journal. 2023; 125(3), 781-793
[27] Fountain, J. and Lamb, C. Generation Y as young wine consumers in New Zealand: how do they differ from Generation X. International Journal of Wine Business Research. 2011; 23(2), 107-24.
[28] Olsen, J. E., Thach, E. C. and Nowak, L. Wine for my generation: exploring how US wine consumers are socialized to wine. Journal of Wine Research. 2007; 18(1), 1-18.
[29] Antonelli, G. (a cura di) Marketing agroalimentare. Specificità e temi di analisi. Milano: FrancoAngeli. 2004.
[30] Onur, I., Bruwer, J. and Lockshin, L. Reducing information asymmetry in the auctioning of non-perishable experience goods: The case of online wine auctions. Journal of Retailing and Consumer Services. 2020; 54, 1-13.
[31] Dodds, W. B. and Monroe K. B. The Effect of Branded & Price Information on Subjective Product Evaluations. Advances in Consumer Research. 1985; 12, 85-90.
[32] Keown, C. and Casey, M. Purchasing behavior in the Northern Ireland Wine Market. British Food Journal. 1995; 97(1), 17-20.
[33] Netemeyer, R. G., Bearden, W. O. and Teel, J. E. Consumer susceptibility to interpersonal influence and attributional sensitivity. Psychology & Marketing; 1992; 9(5), 379-394.
[34] Solomon, M. R., Bamossy, G., Askegaard, S. and Hogg, M. K. Consumer behavior: A European perspective. Pearson. 2019.
[35] Oczkowski, E. and Doucouliagos, H. Wine prices and quality ratings: a meta-regression analysis. American Journal of Agricultural Economics. 2015; 97(1), 103-121.
[36] Skuras, D. and Vakrou, A. Consumers' willingness to pay for origin-labelled wine: a Greek case study. British Food Journal. 2002; 104(11), 898-912,
[37] Lange, C., Martin, C., Chabanet, C., Combris, P. and Issanchou, S. Impact of the information provided to consumers on their willingness to pay for champagne: comparison with hedonic scores. Food Quality and Preference. 2002; 13 7-8, 597-608.
[38] Veale, R. and Quester, P. Do consumer expectations match experience? Predicting the influence of price and country of origin on perceptions of product quality. International Business Review. 2009; 18(2), 134-144.
[39] Lecat, B., Le Fur, E. and Outreville, J.F. Perceived risk and the willingness to buy and pay for "corked" bottles of wine. International Journal of Wine Business Research. 2016; 28(4), 286-307.
[40] Sellers-Rubio, R. and Nicolau-Gonzalbez, J. L. Estimating the willingness to pay for a sustainable wine using a Heckit model. Wine Economics and Policy. 2016; 5(2), 96-104.
[41] Amato, M., Ballco, P., López-Galán, B., De Magistris, T. and Verneau, F. Exploring consumers' perception and willingness to pay for "Non-Added Sulphite" wines through experimental auctions: A case study in Italy and Spain. Wine Economics and Policy, 2017, 6(2), 146-154.
[42] Lanfranchi, M., Schimmenti, E., Campolo, M. and Giannetto, C. The willingness to pay of Sicilian consumers for a wine obtained with sustainable production method: An estimate through an ordered probit sample-selection model. Wine Economics and Policy, 2019, 8(2), 203-215.
[43] Orth, Ulrich. Consumer personality and other factors in situational brand choice variation. Journal of Brand Management. 2005; 13(2), 115-133.
[44] Stöckl, A. Der Flaschenverschluss zur Differenzierung im Marketing. In: Der Winzer, 09/2007, Vienna. 2007.

[45] Capitello, R., Bazzani, C. and Begalli, D. Consumer personality, attitudes and preferences in out-of-home contexts: The case of rosé wine in Italy. International Journal of Wine Business Research. 2019; 31(1), 48-67.
[46] Armstrong, G., Kotler, P., Harker, M. and Brennan, R. Marketing: An introduction. Pearson. 2021.
[47] Keller, K. L., and Parameswaran, M. G. Strategic Brand Management: Building, Measuring, and Managing Brand Equity. 5th Edition. Pearson. 2020.
[48] Krishnamurthi, L. and Raj, S. P. An Empirical Analysis of the Relationship between Brand Loyalty and Consumer Price Elasticity. Marketing Science. 1991; 10(2), 172-183.
[49] Lim, T. and McCann, R. J. Geometrical Bounds for Variance and Recentered Moments. Mathematics of Operations Research. 2022; 47(1), 286-296.
[50] Benjamin, A. T. and Quinn, J. Proofs that Really Count: The Art of Combinatorial Proof. The Mathematical Association of America. 2003.

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Szymkowiak, A., Garczarek – Bąk, U., & Faganel, A. (2024). Enriching product exposure in e-commerce through a hedonistic and utilitarian cue. *Wine Economics and Policy* 13(1): 109-126. doi: 10.36253/wep-15067

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Enriching product exposure in e-commerce through a hedonistic and utilitarian cue

Andrzej Szymkowiak[1,2], Urszula Garczarek – Bąk[2,*], Armand Faganel[3]

[1] *Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcka 129, 165 00 Praha-Suchdol, Czech Republic*
[2] *Department of Commerce and Marketing, Poznan University of Economics and Business, Al. Niepodległości 10, 61-875 Poznań, Poland*
[3] *Faculty of Management, University of Primorska, Slovenia*
E-mail: andrzej.szymkowiak@ue.poznan.pl; Urszula.Garczarek-Bak@ue.poznan.pl; armand.faganel@gmail.com
*Corresponding author.

Abstract. With the projected growth in the global wine market, the ongoing impact of the COVID-19 pandemic, and the increasing prevalence of e-commerce, a pressing need arises to devise unique and engaging ways to present product offerings. While prior research has shed light on the potential of online sales platforms for wineries and the role of wine bottle labels in influencing consumer purchasing behavior, scant attention has been given to the presentation of wine products in the realm of e-commerce. Therefore, the primary objective of this study is to examine the impact of including visual cues (symbols) in online product displays on individuals' perceptions of the product and their likelihood to make a purchase. Specifically, we aim to investigate how the placement of elements related to wine consumption, such as a 'Glass', and the representation of the product's raw materials, such as a bunch of 'Grapes', affect consumer purchasing choices. The results from a simulated online wine store demonstrate the substantial influence of including a 'Glass' symbol on consumers' selections. Furthermore, a series of eye-tracking laboratory experiments conducted in Poland, involving a total of 140 participants, provides deeper insight into underlying mechanisms. These findings reveal that augmenting a wine product with a hedonic symbol, such as a 'Glass', significantly enhances consumer perception of the product. Additionally, it exerts influence on their 'Product Attitude' and 'Product Taste' assessment, both of which are integral components of product perception. This study has the potential to offer valuable insights for wine marketers, e-commerce retailers and researchers specializing in the field of consumer behavior and marketing. Beyond the wine industry, the implications of this research extend to other sectors that rely on e-commerce platforms for sales.

Keywords: e-commerce, wine marketing, hedonistic cue, utilitarian cue, eye tracking.

1. INTRODUCTION

In our rapidly evolving digital landscape, characterized by the swift consumption of web content and the emergence of online businesses as well as educational platforms, there is an increasing demand for improved customer

usability [1]. While e-commerce offers a vast array of options for filtering and categorizing products, enriching product presentations, it also presents a challenge due to the overwhelming amount of product information in catalogues, often leaving customers bewildered. To address this issue, product cues have emerged as a valuable solution. Additionally, advancements in sensor technology, such as eye trackers, now enable us to capture users' attention during shopping experiences, providing valuable insight with regard to consumer interest in products [2].

The COVID-19 pandemic had profound repercussions on the global wine industry, reshaping consumer behavior and market dynamics [3]. In addition to its immediate health impact, the pandemic has induced two significant effects on the wine market. Firstly, it has disrupted the supply chains for high-value wine products, leading to decreased availability [4]. Secondly, lockdown measures in various countries have altered the consumption landscape, limiting opportunities for wine consumption in traditional settings such as restaurants, and encouraging the proliferation of e-commerce platforms [5]. Notably, online, mobile and virtual channels for wine purchases have steadily gained ground [6]. This shift prompted wine producers to invest in online channels to sustain their businesses during the crisis, accelerating the ongoing digitization trend [7]. In the USA, online wine sales, which accounted for only 5% in 2019, surged dramatically during the 2020 lockdown, growing by a staggering 198% in terms of USD sales [8]. Projections indicate that online wine retail sales in the USA may reach 75% by 2025, as demonstrated via the time regression-based model proposed by Huq et al. [9].

In previous research, such as the work by Jiang and Benbasat [10], it has been confirmed that functional mechanisms, including vividness and interactivity, play pivotal roles in influencing the efficacy of online product presentations. Moreover, Pavlič et al. [11] have explored advanced technological perspectives on interactive product placement, highlighting its significance in online brand integration. Consumer attitudes and purchase intentions are greatly influenced by online product presentation, just as they are in traditional retail [12]. However, despite the ability to modify product displays in e-commerce, wine presentation has not received adequate research attention.

Wine is a uniquely multifaceted product on the food market, with attributes such as provenance, ratings and sustainable production practices gaining prominence. Choosing the right wine, while considering numerous attributes, often requires a high level of expertise that only a minority of consumers possess [13]. This leads to the critical question: Can enhancing product presentation through the inclusion of symbolic elements improve consumers' perception of wine products and, consequently, increase their willingness to make a purchase?

Our study contributes to the expanding body of research on food and beverage consumption as well as marketing practices in e-commerce. It is essential to acknowledge the complexity of this domain, as the question of which quality cues matter most to consumers remains elusive [14]. In our study, it is specifically explored how wine cues impact consumer behavior in the e-commerce setting, bridging the gap between traditional food-related research and the unique context of purchasing wine online.

2. THEORETICAL FRAMEWORK

To understand the dynamics of consumer preferences and decision-making within the context of the wine market, it is essential to draw upon theoretical frameworks. The Cue Utilization Theory, developed by Olson and Jacoby [15], posits that consumers rely on various cues, including product attributes and informational stimuli, to assess the quality of food products. This theory suggests that specific cues may exert varying degrees of influence on purchase decisions depending on individual profiles and product characteristics [16]. Complementing this perspective, the Stimulus, Organism, Response (S-O-R) theory by Jacoby [17] emphasizes the role of external stimuli in shaping individuals' actions.

2.1. Hedonic and utilitarian factors in consumer behavior

Consumer behavior is intricately influenced by the interplay between hedonic and utilitarian aspects of products, shaping their purchasing decisions and preferences. D'Astous et al. [18] emphasize that effective sales promotion strategies often hinge on consumers perceiving both hedonic and utilitarian benefits in the products they consider. Batra and Ahtola [19] offer a fundamental distinction, defining the hedonic dimension as related to emotional and sensory experiences, while the utilitarian dimension is focused on the instrumental or functional value a product provides. In the realm of e-commerce, where physical product experiences are limited, as highlighted by Mallapragada et al. [20], these characteristics gain even more significance.

Exploring this further, Liao et al. [21] delve into online impulse purchasing behaviors, uncovering that enhancing product involvement and web interface quality triggers positive emotions and fosters impulsive buying decisions, particularly in the case of utilitarian prod-

ucts. Bettiga et al. [22] venture into neuroscience, revealing disparities in emotional responses to functional and hedonic products. They note that unconscious emotions, generated by functional products, may not be consciously recognized, while a profound correlation exists between physiological and self-reported arousal for hedonic products. Basso et al. [23] shed light on the role of time pressure in purchase decisions, showcasing the susceptibility of utilitarian purchases to its effects. Wang et al. [24] note that perceived deception has less detrimental impact on the intention to repurchase hedonic products compared to utilitarian ones, suggesting strategies to enhance repurchase intentions for e-tailers.

It is important to recognize that the effectiveness of promotion strategies, as discussed by Kronrod et al. [25], varies based on whether a product is perceived as hedonic or utilitarian. For example, while one-for-one promotions may enhance purchase intentions for utilitarian products, they can undermine them for hedonic products [26]. These recent insights into hedonic and utilitarian purchasing dimensions underscore their critical role in shaping consumer behavior, particularly in the context of online shopping, where sensory experiences are limited. Understanding the interplay of these dimensions is pivotal for businesses seeking to tailor their marketing strategies and optimize product presentation in the dynamic landscape of e-commerce.

2.2. Visual presentation of wine

Visual presentation, particularly wine labels, stands as a central determinant of consumer behavior on the wine market [27]. Research underscores its significance through various dimensions. Label design elements such as color play a substantial role in wine pricing, with clean or specially-designed labels commanding price premiums and warm colors prompting price discounts [27]. Semiotics, as explored by Celhay and Remaud [28], unveil how consumers perceive characteristics through contrasts and oppositions, forming a visual language of wine labels. Consumer reading patterns of wine bottle labels differ depending on experience, significantly impacting purchase intentions [29]. Gender-based differences in label perception have been highlighted, with women gravitating toward front label information and men emphasizing back label descriptors [30]. Age and experience also play a part, with young and less experienced wine consumers tending to focus on the label, giving more attention to front labels than back ones [31,32].

The introduction of health warnings on alcoholic beverage labels has regained prominence in consumer studies. Kokole et al. [33] have observed that existing labels, such as pregnancy logos or responsibility messages, are suboptimal, often going unnoticed or not fully understood. However, their real-world, long-term labeling intervention have demonstrated that alcohol health warning labels designed to be prominently visible and containing novel, specific information hold potential as part of an effective labeling strategy. In this context, Annunziata et al. [34] discovered that the inclusion of a logo illustrating the consequences of alcohol on the brain diminishes consumer utility. Similarly, Staub et al. [35] found that while health warning labels increase the perception of certain risks, the effect size remains modest. These dimensions collectively emphasize the pivotal role of visual presentation in shaping consumer choices and preferences in the wine industry.

The shift towards e-commerce in wine sales is evident, with a notable increase in online wine sales [36]. The examination of cues influencing wine purchasing decisions in an online context is gaining importance, particularly in mature markets with substantial potential for growth and technological innovation [37]. Research by WMC [38] highlights the significance of positive online wine purchase experiences in cultivating repeat buyers. This aligns with the perspective underlined by Wang et al. [39], from which consumers, faced with growing information asymmetry on the online market, consider alternative signals when assessing Product Quality.

Research is scarce concerning the effects of different online wine presentation features on consumers' purchasing intentions. This is mostly in regards to the proportion between picture and words (e.g. [40]), perceived authenticity [41], photo or video preference [42], information asymmetry [43], social influence and cues [44,45], presentation on social media [46], ascending or descending order of wines, sorted by quality [47], website design [48], etc. Nonetheless, to the authors' knowledge, the arrangement of picture elements for online wine presentation has only been researched in extremely rare cases. Our research gap regards the potential to influence perception through the modification of the context and presentation of products in e-commerce. The central focus of this study is encapsulated in the following research question:

(RQ): What impact does the inclusion of a visual cue in online product displays have on individuals' perceptions of the product and their propensity to make a purchase?

3. METHOD

Our research aims to assess the impact of additional elements on product perception in e-commerce. To

achieve this, we conducted a series of complementary studies using diverse methods, including varying levels of psychological realism and gathering both declarative as well as eye-tracking data. We employed eye-tracking data to identify disparities in participants' focal points within the product area. As Hwang et al. [49] have highlighted, eye-tracking studies offer advantages over self-reports for understanding attitudes and behaviors, providing valuable insights into information processing, recall and attention.

In the initial study (Study 1A), a between-group online questionnaire was employed to examine how cues influence the perception of different product attributes. Subsequently, Study 1B took place in a controlled laboratory environment, ensuring consistent exposure times and uniform product presentations. It is important to note that both studies used the same stimuli—a single bottle of a no-name white wine with or without a cue—making the second study an extension of the first. According to Maehle et al. [50], the food sector traditionally categorizes products into two main types: hedonic and utilitarian. Hedonic are those consumed primarily for sensory pleasure rather than addressing hunger or physiological needs, while utilitarian are chosen mainly for their functionality and ability to satisfy hunger. In our proposal, we suggest that symbols, such as a 'Glass,' can be used to encourage hedonistic consumption, whereas cues alike 'Grapes', may signal a more utilitarian choice.

The second series of studies (2A, 2B, 3A, 3B) involved a laboratory test with higher psychological realism, incorporating the use of an eye-tracker to collect additional data.

A total of 80 individuals, recruited from university students and staff members (20 participants in each variation), participated in this study. They were asked to indicate their preference between products A and product B using a seven-point bipolar scale.

Our ethical consent process was thorough and comprehensive. We provided participants with clear and detailed information about the study's objectives, procedures, potential risks and benefits. Emphasizing the voluntary nature of participation, individuals were assured they could withdraw their consent at any time without consequences.

To acknowledge participants' time and effort, we provided compensation in the form of gift cards.

Importantly, we maintained strict data privacy and confidentiality measures to safeguard participants' personal information. We confirm that our research obtained approval under Resolution No. 14/2022 from the Research Ethics Committee at Poznań University of Economics and Business for scientific research involving humans at PUEB.

Study 1A

The first experiment employed a cross-group design, with participants randomly assigned to one of three conditions. To maintain consistency, three stimuli were created, all based on the same wine bottle with a blurred label. These stimuli included a photo of a wine bottle without any additional elements ('Control'), a bottle of wine with a bunch of grapes ('Grapes'), and a bottle of wine with a glass next to it ('Glass').

Data was collected through a web-based survey, involving a sample of 366 individuals based on convenient selection. The participants were distributed across the 'Control' (121 people), 'Glass' (123 people), and 'Grapes' (122 people) groups. On average, the participants were 38 years old (SD = 12.15, min = 18, max = 75), and the group represented a diverse demographic (Table 1). The study targeted adults who reported alcohol

Table 1. Respondents' characteristics.

Factor		Frequency
Gender	Female	57%
	Male	42%
	Other /prefer not to say	0%
Education	Less than a high school diploma	0%
	High school degree or equivalent	22%
	Bachelor's degree	51%
	Master's degree	21%
	Doctorate	1%
	Other	4%
Household income (USD)	<= 19,999	5%
	20,000-29,999	13%
	30,000-39,999	8%
	40,000-49,999	13%
	50,000-59,999	18%
	60,000-69,999	10%
	70,000-79,999	12%
	80,000-89,999	7%
	>=90,000	13%
Status	Employed full-time	69%
	Employed part-time	10%
	Retired	3%
	Self-employed	7%
	Student	2%
	Unable to work	1%
	Unemployed	8%

Table 2. CFA results.

	Item	Statements: *This product is ….*	Loading	*p*-value	Cronbach's α	CR	AVE
PA	PA1	Unappealing / Appealing	0.86	***	0.96	0.96	0.82
	PA2	Bad / Good	0.89	***			
	PA3	Unpleasant / Pleasant	0.92	***			
	PA4	Unfavourable / Favourable	0.93	***			
	PA5	Unlikable / Likable	0.94	***			
PQ	PQ1	Of high quality	0.89	***	0.89	0.89	0.74
	PQ2	Valuable	0.90	***			
	PQ3	Expensive	0.78	***			
PT	PT1	Tasty	0.93	***	0.91	0.92	0.8
	PT2	Delicious	0.94	***			
	PT3	Aromatic	0.79	***			

PA – Product Attitude, PQ – Product Quality, PT – Product Taste.

consumption based on screening questions, irrespective of frequency or preferences, but with a controlled preference for the product category (WWF – white wine preference) on a seven-point Likert scale ('I like white wine').

After participants viewed one of three different wine product images without any time constraints, they answered questions about the given variables: Product Attitude (PA), Product Quality (PQ) and Product Taste (PT) using a five-item construct on a seven-point bipolar scale for PA and a three-item Likert scale for PQ and PT. The Product Attitude scale was adapted from Spears and Singh's [51] approach to measuring attitude towards brand. Meanwhile, Product Quality was adapted based on Sun et al. [52]. Perceived Quality Value items, and Product Taste was adapted from sensory analysis proposed by Gasiński et al. [53] to be used for beer evaluation.

To maintain data integrity in our online questionnaire, we implemented extra precautions, including attention checking questions. Participants failing to provide accurate responses to these checks, those exposed to the stimulus for less than three seconds and individuals among the top 25% with the fastest response times to all questions (indicating potential superficial reading) were excluded from the analysis.

The conducted Confirmatory Factor Analysis (CFA) validated the research tool's reliability, with a loading area of 0.79, Cronbach's α and Composite Reliability (CR) above the recommended 0.7, and Average Variance Extracted (AVE) above 0.5 (see Table 2). The Heterotrait-Monotrait (HTMT) values were all below 0.9 for each pair of variables. In Study 1A, one-way ANCOVA was performed across three groups, controlling participants' general preferences with regard to white wine.

Study 1B

In the subsequent study, experimental conditions of the initial study were replicated and the same stimuli was used ('Control', 'Glass', 'Grapes'), but with modifications. Participants were exposed to the stimuli for a fixed duration of five seconds, the duration determined on the basis of data analysis from the first study. The trial was conducted in a controlled Consumer Research Laboratory with a constant temperature of approximately 22°C and lighting levels maintained at around 740 lx.

Unlike the first study, participants in this trial were presented with stimuli on a uniform device—a high-resolution (4K), 27-inch monitor with excellent color reproduction, meeting RGB standards with 99.8% accuracy. Due to COVID-related restrictions, the study was limited to 60 participants authorized to be present at the University and its laboratory. The participants were primarily university students and administrative employees, randomly assigned to three groups of 20 people.

In addition to the question about preferences for white wine (WWP), participants were asked about three issues: Willingness to Try (WWT), Willingness to Buy (WWB), each measured by one statement, and Urge to Buy, measured by three statements (e.g. 'I experience a sudden urge to buy this wine'), following a similar approach to that proposed by Szymkowiak [54].

Study 2A and 2B

After obtaining inconsistent findings in our initial investigations (studies 1A and 1B), we conducted a more comprehensive series of laboratory tests. In total, eight

experiments were carried out, with four focused on red wine (Product A) and four on champagne (Product B).

Graphics resembling an online wine store's screenshot were prepared to facilitate the study. Two parallel screenshots were simultaneously displayed on a 27-inch monitor within a single view. Before primary assessment, participants spent a few minutes in the room to adapt their eyesight to the artificial lighting. Subsequently, the eye-tracker was calibrated at nine different points to ensure accurate data collection.

These trials were aimed at investigating the influence of cues such as a 'Glass' (Study 2A and 2B) and Grape cluster (Study 3A and 3B) on consumer behavior. The positioning of the cues was randomly assigned to either the left (Variant 1) or the right (Variant 2) side of the product.

In Study 2A, participants were instructed to select their preferred red wine, while in Study 2B, they were asked to choose their preferred champagne. To maintain consistency and reduce variables, each product pair was deliberately designed to be visually similar. Additionally, the product descriptions indicated that both options belonged to the same wine type, originated from the same country and were priced identically. This approach was targeted at ensuring psychological realism while minimizing external influences.

In both studies 2A and 2B, an additional 'Glass' element, symbolizing hedonic consumption, was introduced alongside one of the bottle photos. To account for the potential impact of screenshot placement on the participants' product choices (either on the right or left side of the screen), we employed an experimental design. The independent variable, represented by the 'Glass' element, was systematically placed either on the left (variant 1) or the right side (variant 2) in two distinct groups.

Study 3A and 3B

The objective of Studies 3A and 3B was to replicate the fundamental impact of an additional cue on product preference within the context of purchasing decisions. In these variations, the introduced element consisted of a cluster of 'Grapes', symbolizing utilitarian consumption. The general study design is illustrated in Figure 1.

4. RESULTS

Analysis revealed a significant difference in Product Attitude depending on the presence or absence of an accompaniment next to the bottle ($F(2, 362) = 3.152$, $p = 0.44$, $\eta^2 = 0.013$). Post-hoc analysis showed that the 'Glass' version significantly increased Product Attitude compared to the control ($t(364) = 2.463$, $p = 0.038$, $d = 0.316$), with no other significant differences observed. A similar pattern was found for Product Taste, indicating a main effect ($F(2, 362) = 3.539$, $p = 0.3$, $\eta^2 = 0.012$), with the 'Glass' version enhancing the perception of taste ($t(364) = 2.412$, $p = 0.043$, $d = 0.309$). However, no statistically significant differences in Product Quality Perception were identified on the basis of the additional element on the bottle ($F(2, 362) = 0.657$, $p = 0.519$).

In Study 1B, despite the smaller sample size, stronger main effects were observed. Analysis of covari-

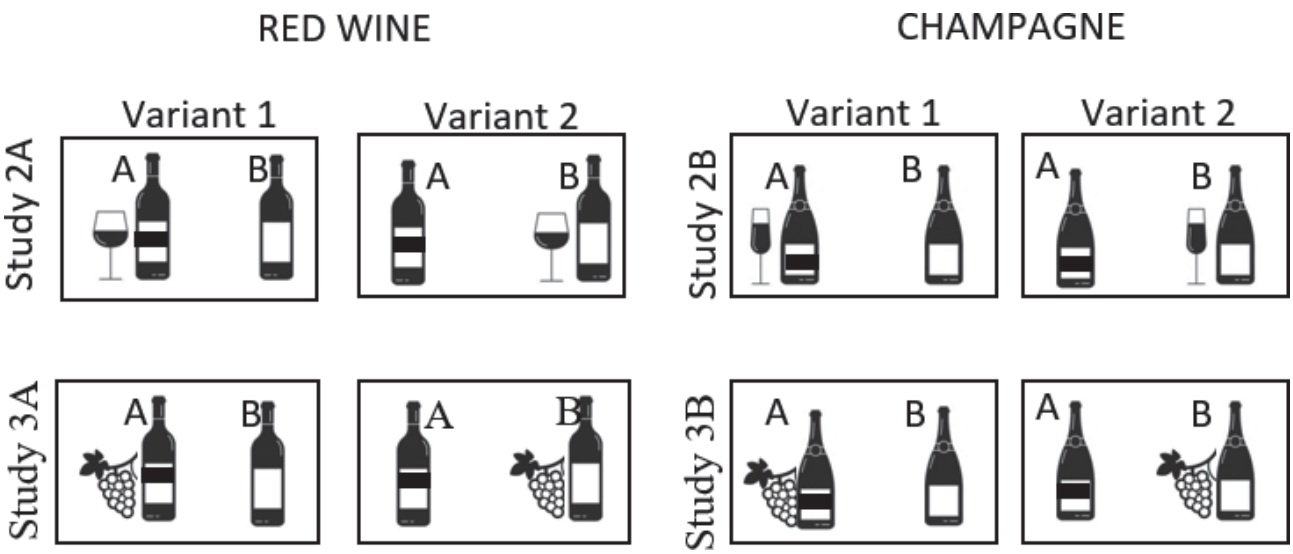


Figure 1. Study 2A, 2B, 3A, 3B scheme.

ance indicated that the presence of an accompaniment affected the Urge to Buy ($F(2.57) = 3.661$, $p = 0.032$, $\eta^2 = 0.114$). Specifically, a significant difference was found between the control version (M = 1.9, SD = 1.119) and that with the bunch of 'Grapes' (M = 3.0, SD = 1.298, $t(59) = 2.68$, $p = 0.028$, d = 0.837). The version with a 'Glass' (M = 2.65, SD = 1.496) showed a medium-level effect (d = 0.571), but was not statistically significant in this sample ($t(59) = 1.806$, $p = 0.171$). Willingness to Try (WTT) did not reach statistical significance ($F(2.57) = 2.244$, $p = 0.115$, $\eta^2 = 0.073$), likely due to larger standard deviations across variables. Notably, a significant effect was observed for Willingness to Buy ($F(2.57) = 6.27$, $p = 0.003$, $\eta^2 = 0.18$), with the bottle featuring a bunch of 'Grapes' (M = 3.75, SD = 1.446) significantly outperforming the control (M = 2.25, SD = 1.164, $t(365) = 3.5$, $p = 0.003$, d = 1.107) and indicating a large effect size. A visual representation of the means across all variables measured in Study 1A and 1B can be found in Figure 2.

In Study 2 (both 2A and 2B), we examined whether changing the location of the 'Glass' affected product preference. In Study 2A, participants using a seven-point scale showed a higher preference for product A (bottle with hedonic cue) in Variant 1 (M = 2.8, SD = 2.042). In Variant 2, the preference was for product B (product with a hedonic cue), (M = 4.65, SD = 1.461). These values were significantly different, indicating a large effect size ($F(1.38) = 10.861$, $p = 0.002$, $\eta^2 = 0.222$). For the champagne choice (Study 2B), the product with the added 'Glass' was also preferred ($F(1.38) = 5.560$, $p = 0.024$, $\eta^2 = 0.128$), despite the variant. See Figure 3 for a visual representation of these findings.

The analysis of results showed a trend in product preference with the bunch of 'Grapes', but it did not reach statistical significance for wine in Study 3a ($F(2.38) = 0.933$, $p = 0.340$, $\eta^2 = 0.024$), with a small effect size. In Study 3B, the results were not entirely conclusive, as a medium effect size was achieved at the significance level

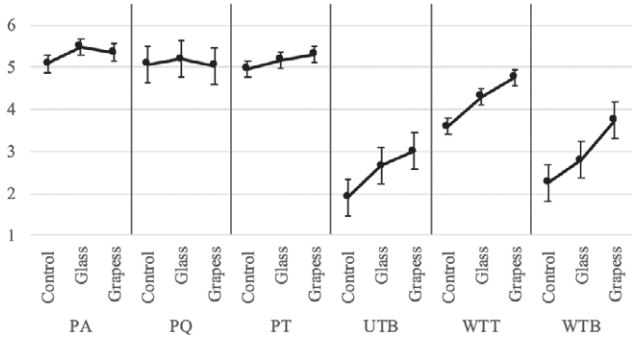


Figure 2. Results from Study 1A and 1B.

Figure 3. Results from study 2A and 2B.

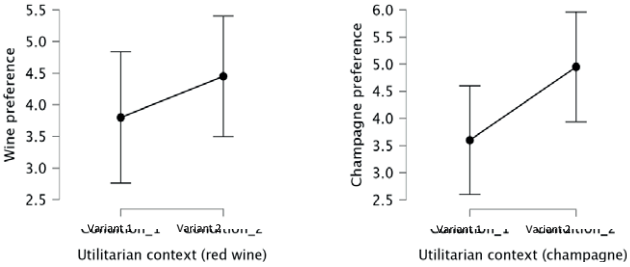


Figure 4. Results from study 3A and 3B.

Table 3. AOI product image time view (in seconds).

	Variant 1		Variant 2	
	Product A	Product B	Product A	Product B
Study 2A	3.52 (9.06)	2.19 (8.33)	1.9 (8.19)	2.29 (8.45)
Study 2B	4.15 (7.31)	3.47 (6.97)	3.55 (7.63)	4.38 (8.36)
Study 3A	2.81 (9.4)	2.17 (8.01)	2.9 (9.57)	3.32 (8.57)
Study 3B	3.39 (7.22)	2.71 (7.38)	2.8 (6.61)	3.31 (7.52)

Note: The values in parentheses apply to the entire e-product card.

of $p = 0.054$ ($F(2.38) = 3.941$, $\eta^2 = 0.094$). A visual representation of these results is presented in Figure 4.

Based on the data obtained from measuring eye movement, a quantitative and qualitative comparison can be made. The fixation time on the product area (photos) and the entire product card could be compared by plotting the Area of Interest (AOI). In Appendix 2, an example of the AOI determination area is provided for Study 2B in both scenarios. For better clarity, separate graphics indicate areas that would partly overlap. In Table 3, the aggregate times are demonstrated for all variants, products and different conditions. The data allow to indicate that in each of the eight cases, a photo containing an additional element attracted the consumer's attention for a longer time. Out of eight compilations

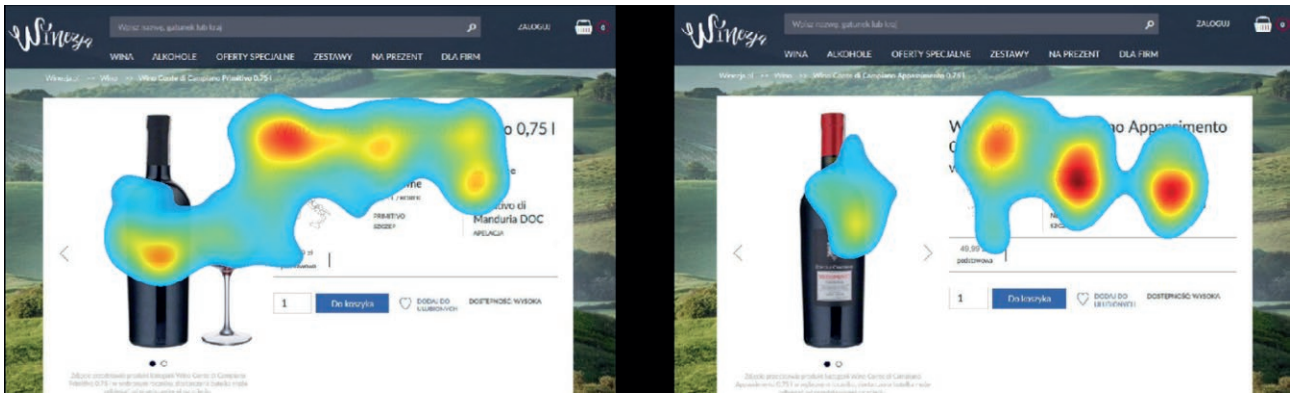


Figure 5. Study 2A (variant 1).

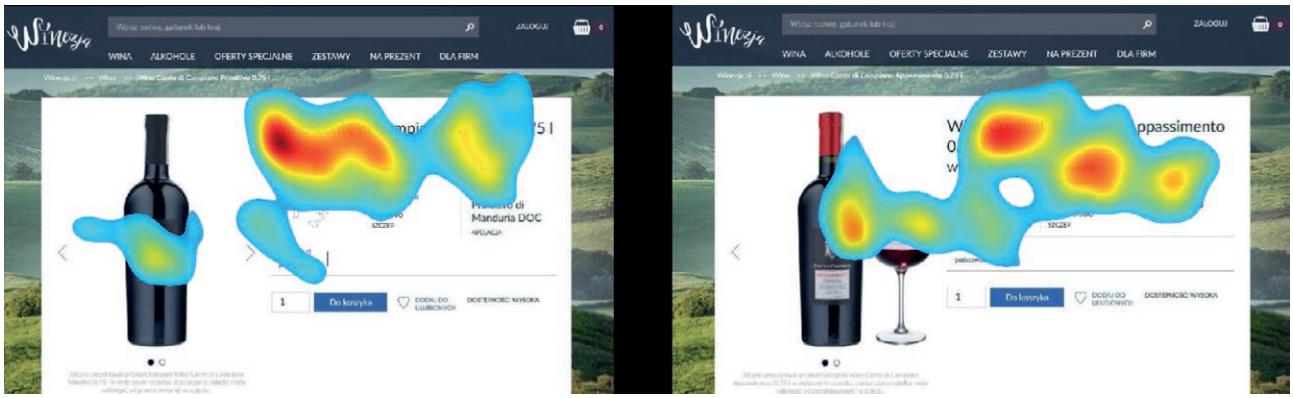


Figure 6. Study 2A (variant 2).

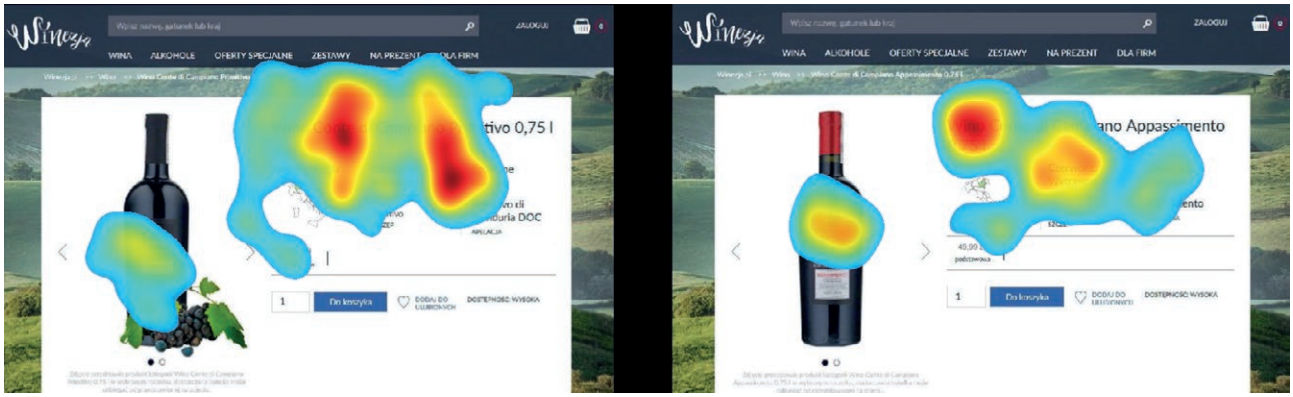


Figure 7. Study 3A (variant 1).

concerning the observation time of the entire product sheet, only in two cases (Study 3A, variant 2 and Study 3B, variant 1) was the length not in favor of the product for which the image was reinforced by an additional element. This is particularly important within the context of the results regarding the previously presented preference analysis.

The qualitative analysis of fixation and the graphical representation in the form of heat maps indicate that the element ('Glass') itself was not the dominant ele-

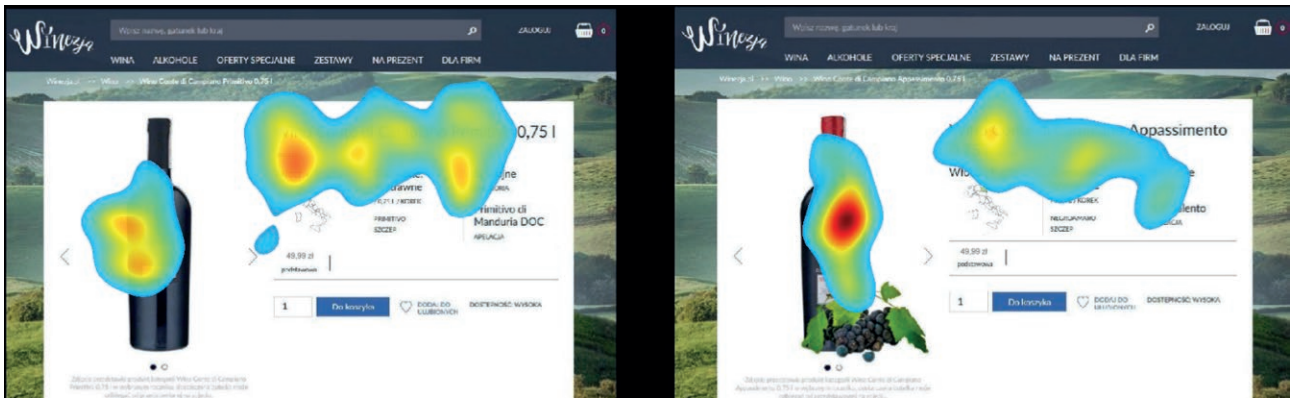


Figure 8. Study 3A (variant 2).

ment attracting attention of the respondents (see Figures 5 and 6). In the case of 'Grapes' (Figures 7 and 8), the respondents even neglected this element, maintaining a peripheral perspective.

5. DISCUSSION

The aim of the current research is to determine the influence of additional symbols, whether hedonic or utilitarian, as cues stimulating wine purchase decisions within an e-commerce context. As expected, the results of Study 1A demonstrated that associating a wine product with a 'Glass' symbol (considered hedonic) enhances product perception. Differences between the 'Control' and 'Glass' condition groups emerged in terms of Product Attitude (PA) and Product Taste (PT). Notably, both PA and PT appraisal are components of product perception linked to an affective dimension. This aligns with the idea that wine, primarily consumed for hedonic purposes, may be influenced by an individual's hedonic orientation. Hedonic-oriented wine choices often prioritize sensory experiences, which can dominate when consumers seek emotions and pleasure.

Interestingly, the 'Grape' symbol, often associated with utilitarian aspects such as grape type, origin or harvest, did not significantly affect taste assessment. Instead, it was the 'Glass' cue that influenced taste perception, possibly due to its connection with consumption. However, neither the hedonic nor utilitarian symbol significantly impacted perceived Product Quality. Given that both attitude sub-dimensions usually influence behavioral intentions, as seen in research, e.g. by Lee and Yun [55] on organic food purchase intentions, we decided to refine our approach.

Considering that young consumers often view wine as a social product driven by hedonic motives, we explored Urge and Willingness to Buy in addition to product assessment. In Study 1B, we replicated the experiment in a more controlled environment. Fernandes et al. [56] suggest that hedonic motives trigger buying processes and shape consumer attitudes, while utilitarian motives are linked to functional value in online shopping. Analysis of variance revealed statistically significant results only for the 'Grape' cue in terms of Urge to Buy (UTB) and Willingness to Buy (WTB), compared to the control group. These findings align with the research results achieved by Habann [57] indicating a preference for utilitarian characteristics in German online wine shops.

However, it is essential to note that participants in the control group, in general, poorly assessed the presented product, possibly due to lack of information. This could lead to decision reluctance even with the addition of a cue to a simple product. Subsequent trials were designed to test whether these factors interact differently with more complex imagery. We introduced greater psychological realism by using an online wine purchasing website and assessing consumers' final decisions regarding products with and without cue preferences.

When participants had to choose between two products, our analysis revealed that changing the location of the 'Glass' cue modified preferences, making the product more attractive. The addition of the hedonic cue resulted in longer fixation times, both for the entire product image and the Area of Interest ('Glass' cue sign). A similar effect was observed with the 'Grape' symbol, although it did not reach statistical significance. Further research in this area is recommended, particularly when the 'Grape' symbol is positioned to the left of the bottle, where shorter observation times were observed. This could be attributed to factors such as color, size or contrast of the grape symbol with the bottle.

Table 4. Findings summary.

Study number	Study characteristic	Main findings
Study 1A	Online study with a no-name white wine bottle + cue, assessing general wine preferences.	The Glass cue significantly improved attitude and taste perception, with no difference in quality perception.
Study 1B	Lab study with a no-name white wine bottle + cue, focusing on buying intentions.	The Grapes cue increased the urge to buy and willingness to buy significantly, with no significant medium effect for the Glass cue.
Study 2A	Lab study on red wine in e-commerce environment, testing preference changes with a hedonic cue location.	Participants showed a preference for the product with Hedonic cue, demonstrating a large effect size.
Study 2B	Lab study on champagne in an e-commerce environment, testing preference changes with a hedonic cue location.	Preference for the product with the Hedonic cue showed a medium effect size.
Study 3A	Lab study on red wine in an e-commerce environment, testing preference changes with a utilitarian cue location.	No significant preference change was observed for wine with the Grapes cue.
Study 3B	Lab study on champagne in an e-commerce environment, testing preference changes with a utilitarian cue location.	A medium effect size was observed for champagne preference with added cues, nearing significance.

It is worth noting that studies investigating the hedonic and utilitarian presentation of the same products, as in Mundel et al. [58], have yielded inconclusive results. In some trials, it has even been suggested that the effect of an evoked context on hedonic responses may not be universal. Therefore, our research attempts to address this gap in the literature by assessing the importance of cue symbols.

6. MANAGERIAL IMPLICATIONS

In today's rapidly evolving digital landscape, characterized by the swift consumption of web content and the rise of online businesses and educational platforms, user usability assumes a paramount role. Our findings suggest that online wine sellers, as well as producers and marketers of food and drink products, should consider the efficacy of labels in reducing consumer skepticism and providing convenient choices in e-commerce.

In recent works, hedonic responses (i.e. liking) have been increasingly acknowledged, but a deep dive into sufficiently understanding consumer perceptions has not yet been undertaken [59]. Interestingly, even in the case of seemingly hedonic products, online marketers should pay special attention to the utilitarian characteristics of their shop [57]. Importantly, as demonstrated by Fenko et al. [60] consumers tend to be more skeptical toward hedonic labels compared to health-related ones, suggesting that consumer reactions to product claims may be influenced by potential verification of the claim. Moreover, these authors indicate that the influence of consumer skepticism on product experience, product evaluation and purchase intention varies according to different product categories. For hedonic products, such as chocolate cookies, the hedonic label had a more positive effect on consumer responses compared to the health label.

With the plethora of cues and claims on the market, the most critical question is whether and how these signs affect consumer choices. As shown in our research, the hedonic cue positively influences preference for the marked product. Therefore, when customers compare offers from different sellers, this factor may be a deciding factor. Furthermore, it can be successfully applied to any product and does not require significant modifications. In the case of utilitarian cues, such as awards or certificates, proper justification must be provided.

When consumers are driven by utilitarian motives during online shopping, their primary goal is to efficiently find the right product without spending excessive time searching and evaluating alternatives. Therefore, it is crucial to carefully design utilitarian cues that are easily comprehensible to customers. This is of particular significance because it has been shown in various studies that consumers often struggle to discern the additional value presented by cues such as eco-labels, with such messages sometimes causing confusion or even having a detrimental effect on their decision-making [61]. Considering that not all the information provided on product labels is thoroughly read by consumers (as demonstrated by Pérez y Pérez et al. [62]), an excess of information can overwhelm consumers, leading to their inability to absorb it all [56]. Therefore, it becomes essential to minimize any potential misinterpretation of label claims to ensure that consumers fully grasp their meaning [63].

Enterprises should fully demonstrate cues that are easily overlooked by consumers and present critical cues in a clear way, making them unavoidable for consumers [64]. This usability extends to the visual elements presented to users, particularly high-quality images, which

should capture attention, be memorable, convey more than just textual information, evoke emotions and weave a narrative beyond the obvious [65,66].

Drugova et al. [67] provided important indications based on their findings, emphasizing that organic-labelled wheat products with additional claims were valued equally or less than the organic-only version. This suggests that multiple labels on organic products generally provide no additional consumer benefit and are likely to be ignored. These findings underscore the significance of employing a single, most salient cue that distinctly identifies the product.

Roca et al. [68], through an analysis of consumer representations and perceptions regarding environmental approaches, found that the implementation of new logos or information must meet the need for trust expressed by consumers, being in the form of a simple and synthetic global indicator. Therefore, investing in a recognizable cue, preferably graphic, because logos capture more visual attention than text eco-labels [69], is critical in improving consumer valuation of products.

According to Titova et al. [70], the colors of different products can serve as an indicator of quality to consumers, while Pelet et al. [41] stressed the importance of considering the design of wine labels. They revealed that relatively higher purchase intentions seem to be achieved with heraldic colors and low visual complexity, which lead to stronger effects on authenticity regarding pleasure.

In order to shape consumers' beliefs and confidence in purchasing wine online, similar to purchasing organic foods on the Internet, marketers can help consumers develop more positive perceptions of offered products by improving the accessibility of useful and objective information on nutritional content and the production process. Advertising messages could be more successful if they emphasized the promise of personal and social benefits [55]. Their conclusions may also be helpful for professionals in the wine sector, recommending the need to extend and intensify promotion as well as communication activities, highlighting quality and local origin.

Capitello et al. [71] studied the wine preferences of young, Italian consumers, noting that this segment finds the natural label as the most attractive, with more utility from the vineyard name than from any other brand name. They were further interested in back label information, especially concerning the wine production process.

Interestingly, as highlighted by Hu et al. [72], marketing managers responsible for mobile shopping environment design should include adjustments for consumers' specific preferences in different countries (e.g. enjoyable experiences in China vs. functional benefits in Italy), as some Western consumers "tend to base their purchase decision on utilitarian considerations".

The swift growth and integration of artificial intelligence (AI), machine learning and natural language processing applications pose a challenge for managers and policy makers, who must learn to effectively utilize these transformative technologies. A new phenomenon called the "word-of-machine" effect, described by Longoni and Cian [73], refers to the way trade-offs between utilitarian and hedonic attributes influence the acceptance or rejection of recommendations made by AI, introducing fresh avenues for research.

7. LIMITATIONS

The reported empirical results should be interpreted with consideration of several limitations. Firstly, it is important to note that the samples for the eye-tracking studies were drawn from a population consisting of students and university employees. Therefore, it may be worthwhile to replicate these findings on different populations in future research.

Another limitation pertains to the scope of the current study, examining three product types: red and white wine, and champagne. Given the evolving preferences of younger adults who are increasingly exploring alternative alcoholic beverages, it is advisable for consider a broader range of products in future investigation.

Additionally, it is essential to acknowledge the hypothetical nature of the choices made by the participants of this study. While efforts were made to minimize hypothetical bias through the use of a realistic webpage simulation and the selection of similar-priced products with hidden brand information, it should be highlighted that participants were not making real purchases. This aspect of the study may not fully capture the complexities of actual purchase decisions, particularly in light of the high cart abandonment rates in online shopping. The study also accounts for a potential pandemic-related influence on wine consumption, which may have been impacted by reduced social opportunities for drinking and growing income disparities among younger adults.

Furthermore, the conventional categorization of utilitarian and hedonic food products, which was more distinct in earlier literature as highlighted by Maehle et al. [50] and Wang [74], has become less clear-cut. These categories are now merging, as the hedonic and utilitarian characteristics of food products have become more intertwined and carry greater significance. Basic food products, once classified primarily as utilitarian, are now actively marketed for their hedonic qualities, including a

variety of flavors and frozen options, thereby enhancing the overall gastronomic experience.

8. CONCLUSION

In this study, the authors delved into the intricate realm of online wine shopping and the influential role of visual cues, both hedonic and utilitarian, in shaping consumer perceptions and behaviors. The findings shed light on the dynamic relationship between these cues and their impact on product perception, attitude and purchase intentions. Notably, the research allows to underscore the nuanced preferences of consumers, emphasizing the need for tailored strategies in the digital marketplace. Furthermore, the growing convergence is revealed of hedonic and utilitarian attributes in various food product categories, highlighting the importance of marketers adapting to these evolving trends. However, it is essential to acknowledge the study's limitations, including its sample demographics and the focus on specific wine types, calling for future research to expand its scope. Overall, this investigation contributes valuable insights for e-commerce businesses, suggesting that optimizing visual cues in online product presentations can be a potent tool for enhancing consumer engagement and influencing purchase decisions in the ever-evolving digital landscape. Ultimately, understanding the dynamic interplay between hedonic and utilitarian cues in consumer behavior remains a complex and evolving area of study, with ample room for exploration in future research.

REFERENCES

[1] R. Oyekunle, O. Bello, Q. Jubril, I. Sikiru, A. Balogun, Usability evaluation using eye-tracking on e-commerce and education domains, J. Inf. Technol. Comput. 1 (2020) 1-13. https://doi.org/10.48185/jitc.v1i1.43

[2] J. N. Sari, L. E. Nugroho, P. I. Santosa, R. Ferdiana, Product Recommendation Based on Eye Tracking Data Using Fixation Duration, IJITEE (Int. J. Inf. Technol. Electr. Eng.) 5 (2021) 109-116. https://doi.org/10.22146/ijitee.58693

[3] M. Eftimov, G. Popovski, M. Petković, B. Koroušić Seljak, D. Kocev, COVID-19 pandemic changes the food consumption patterns, Trends Food Sci. Technol. 104 (2020) 268-272. https://doi.org/10.1016/j.tifs.2020.08.017

[4] European Commission (EC), Short-term outlook for EU agricultural markets. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/short-term-outlook-spring-2020_en.pdf, 2022 (accessed 21 January 2022).

[5] B. Harfmann, Online sales drive 55% of wine growth. https://www.bevindustry.com/articles/93851-online-sales-drive-55-of-wine-growth, 2022 (accessed 3 February 2022).

[6] N. Cobelli, G. Wilkinson, Online wine purchasing: a comparison between South Africa and Italy, The TQM J. 32 (2020) 837-847. https://doi.org/10.1108/TQM-10-2019-0242

[7] D. Vergamini, F. Bartolini, G. Brunori, Wine after the pandemic? All the doubts in a glass, Bio-based Appl. Econ. 10 (2021) 51-71. https://doi.org/10.36253/bae-9017

[8] L. Thach, Overview of 2020 US Wine Market Stats and 10 Hot Wine Trends for 2021. https://lizthachmw.com/winestars/overview-of-2020-us-wine-market-stats-and-10-hot-wine-trends-for-2021, 2021 (accessed 21 January 2022).

[9] F. Huq, V. Jones, D.A. Hensler, A time series projection model of online seasonal demand for American wine and potential disruption in the supply channels due to COVID-19, Int. J. Wine Bus. Res. 34 (2022) 349-372. https://doi.org/10.1108/IJWBR-03-2021-0015

[10] Z. Jiang, I. Benbasat, Investigating the Influence of the Functional Mechanisms of Online Product Presentations, Inf. Syst. Res. 18 (2007) 367-475. https://doi.org/10.1287/isre.1070.0124

[11] J. Pavlič, T. Tomažič, The (In)effectiveness of Attention Guidance Methods for Enhancing Brand Memory in 360° Video, Sensors 22 (2022) 8809. https://doi.org/10.3390/s22228809

[12] J. Park, S. J. Lennon, L. Stoel, Online product presentation: effects on mood, perceived risk, and purchase intention, Psychol. & Mark. 22 (2005) 695-719. https://doi.org/10.1002/mar.20080

[13] A. Risius, B. O. Klann, S. G. Meyerding, Choosing a lifestyle? Reflection of consumer extrinsic product preferences and views on important wine characteristics in Germany, Wine Econ. Policy 8 (2019) 141-154. https://doi.org/10.14601/web-8204

[14] D. C. Petrescu, I. Vermeir, P. Burny, R. M. Petrescu-Mag, Consumer evaluation of food quality and the role of environmental cues, Eur. Res. on Manag. and Bus. Econ. 28 (2022) 100178. https://doi.org/10.1016/j.iedeen.2021.100178

[15] J.C. Olson, J. Jacoby, Cue utilization in the quality perception process, ACR Special Volumes (1972).

[16] N.C. Lago, A. Marcon, J.L.D. Ribeiro, J.F. de Medeiros, V.B. Brião, V.L. Antoni, Determinant attributes

and the compensatory judgement rules applied by young consumers to purchase environmentally sustainable food products, Sustain. Prod. Consum. 23 (2020) 256–273. https://doi.org/10.1016/j.spc.2020.06.003

[17] J. Jacoby, Stimulus-organism-response reconsidered: an evolutionary step in modeling (consumer) behavior, J. Consum. Psychol. 12 (2002) 51-57. https://doi.org/10.1207/S15327663JCP1201_05

[18] A. d'Astous, R. Legoux, F. Colbert, Consumer perceptions of promotional offers in the performing arts: An experimental approach, Can. J. Adm. Sci. 21 (2004) 242–254. https://doi.org/10.1111/j.1936-4490.2004.tb00339.x

[19] R. Batra, O. Ahtola, Measuring the Hedonic and Utilitarian Sources of Consumer Attitudes, Market. Lett. 2 (1990) 159-170. https://doi.org/10.1007/BF00436035

[20] G. Mallapragada, S. R. Chandukala, Q. Liu, Exploring the effects of "What" (product) and "Where" (website) characteristics on online shopping behavior, J. Mark. 80 (2016) 21-38. https://doi.org/10.1509/jm.15.0138

[21] C. Liao, P.-L. To, Y.-C. Wong, M. D. Kakhki, The impact of presentation mode and product type on online impulse buying decisions, J. Electron. Commer. Res. 17 (2016) 153-168.

[22] D. Bettiga, A. M. Bianchi, L. Lamberti, G. Noci, Consumers' Emotional Responses to Functional and Hedonic Products: A Neuroscience Research, Front. Psychol. 11 (2020) 559779. https://doi.org/10.3389/fpsyg.2020.559779

[23] K. Basso, C. D. Duschitz, C. M. Giacomazzi, M. Sonego, C. A. V. Rossi, D. Reck, Purchase decision and purchase delay of hedonic and utilitarian products in the face of time pressure and multiplicity of options, Rev. Gestão 26 (2019) 112-125. https://doi.org/10.1108/REGE-01-2018-0022

[24] X. Wang, A. R. Ashraf, N. Thongpapanl, K. Y. Wang, Perceived deception and online repurchase intention: The moderating effect of product type and consumer regulatory orientation, J. Consum. Behav. 21 (2022) 1522-1539. https://doi.org/10.1002/cb.2109

[25] A. Kronrod, A. Grinstein, L. Wathieu, Enjoy! Hedonic consumption and compliance with assertive messages, J. Consum. Res. 39 (2012) 51-61. https://doi.org/10.1086/661933

[26] R. G. Dugan, J. J. Clarkson, J. T. Beck, When cause-marketing backfires: differential effects of one-for-one promotions on hedonic and utilitarian products, J. Consum. Psychol. 31 (2021) 532-550. https://doi.org/10.1002/jcpy.1229

[27] A. Galati, S. Tinervia, A. Tulone, M. Crescimanno, G. Rizzo, Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market, J. Int. Food & Agribusiness Mark. 30 (2018) 175-190. https://doi.org/10.1080/08974438.2017.1402728

[28] F. Celhay, H. Remaud, What does your wine label mean to consumers? A semiotic investigation of Bordeaux wine visual codes, Food Qual. Prefer. 65 (2018) 129–145. https://doi.org/10.1016/j.foodqual.2017.10.015

[29] D. Escandon-Barbosa, J. Rialp-Criado, The Impact of the Content of the Label on the Buying Intention of a Wine Consumer, Front. Psychol. 9 (2019) 2761. https://doi.org/10.3389/fpsyg.2018.02761

[30] C. Ferreira, L. Lourenço-Gomes, L. M. C. Pinto, A. P. Silva, Is there a gender effect on wine choice in Portugal? – A qualitative approach, Int. J. Wine Bus. Res. 31 (2019) 618-639. https://doi.org/10.1108/IJWBR-08-2018-0040

[31] I. M. Chaney, External Search Effort for Wine, Int. J. Wine Mark. 12 (2000) 5-21. https://doi.org/10.1108/eb008706

[32] A. Thomas, G. Pickering, The importance of wine label information, Int. J. Wine Mark. 15 (2003) 58-74. https://doi.org/10.1108/eb008757

[33] D. Kokole, P. Anderson, E. Jané-Llopis, Nature and potential impact of alcohol health warning labels: a scoping review, Nutrients 13 (2021) 3065. https://doi.org/10.3390/nu13093065

[34] A. Annunziata, L. Agnoli, R. Vecchio, S. Charters, A. Mariani, The influence of alcohol warning labels on consumers' choices of wine and beer, Wine Econ. Policy 9 (2020) 3-21. https://doi.org/10.36253/web-8189

[35] C. Staub, C. Fuchs, M. Siegrist, Risk perception and acceptance of health warning labels on wine, Food Qual. Prefer. 96 (2022) 104435. https://doi.org/10.1016/j.foodqual.2021.104435

[36] O. Jorge, A. Pons, J. Rius, C. Vintró, J. Mateo, J. Vilaplana, Increasing online shop revenues with web scraping: a case study for the wine sector, British Food J. 122 (2020) 3383-3401. https://doi.org/10.1108/BFJ-07-2019-0522

[37] A. P. Kieling, R. Tezza, G. L. Vargas, Website stage model for Brazilian wineries: an analysis of presence in digital and mobile media, Int. J. Wine Bus. Res. 35 (2023) 45-65. https://doi.org/10.1108/IJWBR-05-2021-0032

[38] Wine Market Council (WMC), Wine Market Council Webinar: A Look at Online & Direct Wine Purchasing in a New Reality, April 3, 2020.

[39] Q. Wang, X. Cui, L. Huang, Y. Dai, Seller reputation or product presentation? An empirical investigation from cue utilization perspective, Int. J. Inf. Manag. 36 (2016) 271-283. https://doi.org/10.1016/j.ijinfomgt.2015.12.006

[40] C. Flavián Blanco, R. Gurrea Sarasa, C. Orús Sanclemente, Effects of visual and textual information in online product presentations: looking for the best combination in website design, Eur. J. Inf. Syst. 19 (2010) 668-686. https://doi.org/10.1057/ejis.2010.42

[41] J.-E. Pelet, F. Durrieu, E. Lick, Label design of wines sold online: Effects of perceived authenticity on purchase intentions, J. Retailing and Consum. Serv. 55 (2020) 102087. https://doi.org/10.1016/j.jretconser.2020.102087

[42] M. Cho, M. A. Bonn, S. Kang, Wine attributes, perceived risk and online wine repurchase intention: The cross-level interaction effects of website quality, Int. J. Hosp. Manag. 43 (2014) 108-120. https://doi.org/10.1016/j.ijhm.2014.09.002

[43] I. Onur, J. Bruwer, L. Lockshin, Reducing information asymmetry in the auctioning of non-perishable experience goods: The case of online wine auctions, J. Retailing and Consum. Serv. 54 (2020) 102060. https://doi.org/10.1016/j.jretconser.2020.102060

[44] M. A. Bonn, W. G. Kim, S. Kang, M. Cho, Purchasing Wine Online: The Effects of Social Influence, Perceived Usefulness, Perceived Ease of Use, and Wine Involvement, J. Hosp. Mark. & Manag. 25 (2016) 841-869. https://doi.org/10.1080/19368623.2016.1115382

[45] S. Sohn, B. Seegebarth, M. Kissling, T. Sippel, Social Cues and the Online Purchase Intentions of Organic Wine, Foods 9 (2020) 643. https://doi.org/10.3390/foods9050643

[46] T. Tomažič, The importance of social media from the wine marketing perspective, Lex localis 15 (2017) 827-844. https://doi.org/10.4335/15.4.827-844(2017)

[47] D. Hölle, S. Aufschnaiter, J. Bogon, C. Pfeuffer, A. Kiesel, R. Thomaschke, Quality ratings of wine bottles in e-commerce: the influence of time delays and spatial arrangement, J. Wine Res. 5 (2020) 1-19. https://doi.org/10.1080/09571264.2020.1723067

[48] S. Chironi, L. Altamore, P. Columba, S. Bacarella, M. Ingrassia, Study of Wine Producers' Marketing Communication in Extreme Territories–Application of the AGIL Scheme to Wineries' Website Features, Agronomy 10 (2020) 721. https://doi.org/10.3390/agronomy10050721

[49] J. E. Hwang, Y. S. Yang, Y. M. Oh, S. Y. Lee, J. E. Lee, S. I. Cho, Differences in visual fixation duration according to the position of graphic health warning labels: An eye-tracking approach, Tob Induc Dis 16 (2018) 39. https://doi.org/10.18332/tid/94327

[50] N. Maehle, N. Iversen, L. Hem, C. Otnes, Exploring consumer preferences for hedonic and utilitarian food attributes, Brit. Food J. 117 (2015) 3039-3063. https://doi.org/10.1108/BFJ-04-2015-0148

[51] N. Spears, S. N. Singh, Measuring Attitude toward the Brand and Purchase Intentions, J. Curr. Issues & Res. in Advert. 26 (2004) 53–66. https://doi.org/10.1080/10641734.2004.10505164

[52] G. Sun, S. D'Alessandro, L. W. Johnson, Exploring luxury value perceptions in China: Direct and indirect effects, Int. J. Mark. Res. 58 (2016) 711-731. https://doi.org/10.2501/IJMR-2016-021

[53] A. Gasiński, J. Kawa-Rygielska, A. Szumny, J. Gąsior, A. Głowacki, Assessment of volatiles and polyphenol content, physicochemical parameters and antioxidant activity in beers with dotted hawthorn (Crataegus punctata), Foods 9 (2020) 775. https://doi.org/10.3390/foods9060775

[54] A. Szymkowiak, B. Borusiak, B. Pierański, P. Kotyza, L. Smutka, Household Food Waste: The Meaning of Product's Attributes and Food-Related Lifestyle, Front. Environ. Sci. 10 (2022). https://doi.org/10.3389/fenvs.2022.918485

[55] H.-J. Lee, Z.-S. Yun, Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food, Food Qual. Prefer. 39 (2015) 259-267. https://doi.org/10.1016/j.foodqual.2014.06.002

[56] E. Fernandes, H. Semuel, M. Adiwijaya, The influence of social media advertising on purchase intention through utilitarian and hedonic shopping motivation: a study at beauty care and anti-aging clinic service in Surabaya, Petra Int. J. Bus. Stud. 3 (2020) 23-36. https://doi.org/10.9744/ijbs.3.1.23-36

[57] F. Habann, C. Zerres, L. Zaworski, Investigating the segment-specific preferences for hedonic and utilitarian online-shop characteristics: the case of German online wine shops, Int. J. Internet Mark. Advert. 12 (2018) 255-269.

[58] J. Mundel, P. Huddleston, B. Behe, L. Sage, C. Latona, An eye tracking study of minimally branded products: hedonism and branding as predictors of purchase intentions, J. Prod. & Brand Manag. 27 (2018) 146-157. https://doi.org/10.1108/JPBM-07-2016-1282

[59] P. Oyinseye, A. Suárez, E. Saldaña, P. Fernández-Zurbano, D. Valentin, M.-P. Sáenz-Navajas, Multidimensional representation of wine drinking experience: Effects of the level of consumers' expertise and involvement, Food Qual. Prefer. 98 (2022). https://doi.org/10.1016/j.foodqual.2022.104536

[60] A. Fenko, L. Kersten, S. Bialkova, Overcoming consumer scepticism toward food labels: The role of multisensory experience, Food Qual. Prefer. 48 (2016) 81-92. https://doi.org/10.1016/j.foodqual.2015.08.013

[61] M. A. Delmas, N. Lessem, Eco-premium or eco-penalty? Eco-labels and quality in the organic wine market, Bus. & Soc. 56 (2017) 318-356. https://doi.org/10.1177/0007650315576119

[62] L. Pérez y Pérez, A. Gracia, J. Barreiro-Hurlé, Not Seeing the Forest for the Trees: The Impact of Multiple Labelling on Consumer Choices for Olive Oil, Foods 9 (2020) 186. https://doi.org/10.3390/foods9020186

[63] S. S. Samant, P. G. Crandall, H.-S. Seo, The effect of varying educational intervention on consumers' understanding and attitude toward sustainability and process-related labels found on chicken meat products, Food Qual. Prefer. 48 (2016) 146-155. https://doi.org/10.1016/j.foodqual.2015.09.005

[64] L. Changbao, H. Peishan, A Literature Review of the Consumer Cognitive Miserliness Behavior and Its Marketing Implications: Based on the Framework of the Cue Utilization Theory, Foreign Econ. & Manag. 40 (2018) 58-70. https://doi.org/10.16538/j.cnki.fem.2018.08.005

[65] J. Baldoni, Using Stories to Persuade, Harvard Bus. Rev. https://hbr.org/2011/03/using-stories-as-a-tool-of-persuasion, 2021 (accessed 28 January 2022).

[66] Á. Veszelszki, Persuasion Strategies on Instagram in Wine Communication and Branding, Acta Univ. Sapientiae, Communication 6 (2019) 83–104. https://doi.org/10.2478/auscom-2019-0005

[67] T. Drugova, K. R. Curtis, S. B. Akhundjanov, Are multiple labels on food products beneficial or simply ignored? Can. J. Agric. Econ./Rev. Can. d'agroecon. 68 (2020) 411-427. https://doi.org/10.1111/cjag.12259

[68] P. Roca, R. Symoneaux, D. Ugalde, F. Jourjon, Analysis of the perceptions of wine consumers toward environmental approaches: Support for the management of environmental strategy, BIO Web of Conferences 15 (2019). https://doi.org/10.1051/bioconf/20191503020

[69] A. Rihn, X. Wei, H. Khachatryan, Text vs. logo: Does eco-label format influence consumers' visual attention and willingness-to-pay for fruit plants? An experimental auction approach, J. Behav. and Exp. Econ. 82 (2019) 101452. https://doi.org/10.1016/j.socec.2019.101452

[70] T.P. Titova, V.G. Nachev, C.I. Damyanov, Food quality evaluation according to their color characteristics, Facta Univ., Series: Automatic Control and Robotics 14 (2015) 1-10.

[71] R. Capitello, L. Agnoli, S. Charters, D. Begalli, Labelling environmental and terroir attributes: Young Italian consumers' wine preferences, J. Cleaner Prod. 304 (2021). https://doi.org/10.1016/j.jclepro.2021.126991

[72] L. Hu, R. Filieri, F. Acikgoz, L. Zollo, R. Rialti, The effect of utilitarian and hedonic motivations on mobile shopping outcomes: A cross-cultural analysis, Int. J. Consum. Stud. https://doi.org/10.1111/ijcs.12868

[73] C. Longoni, L. Cian, Artificial intelligence in utilitarian vs. hedonic contexts: The "word-of-machine" effect, J. Mark. 86 (2022) 91–108. https://doi.org/10.1177/002224292095734

[74] E. Wang, Creating Utilitarian and Hedonic Value from Website Quality an Online Retail Performance, J. Electron. Commerce in Organ. 15 (2017) 1-13. https://doi.org/10.4018/JECO.2017070101

APPENDIX 1. ANCOVA RESULTS

ANCOVA - PA

Cases	Sum of squares	df	Mean square	F	p	η^2
Version	10.442	2	5.221	3.152	0.044	0.013
WWP	189.627	1	189.627	114.484	< .001	0.237
Residuals	599.604	362	1.656			

Descriptives - PA

Version	Mean	SD	N
Control	5.096	1.583	121
Glass	5.403	1.442	123
Grapes	5.411	1.393	122

Post-hoc comparisons - PA

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.407	0.165	-2.463	-0.316	0.038
	Grapes	-0.273	0.165	-1.655	-0.212	0.224
Glass	Grapes	0.133	0.165	0.807	0.104	0.699

ANCOVA - PQ

Cases	Sum of squares	df	Mean square	F	p	η^2
Version	1.814	2	0.907	0.657	0.519	0.003
WWP	165.169	1	165.169	119.605	< .001	0.248
Residuals	499.905	362	1.381			

Descriptives - PQ

Version	Mean	SD	N
Control	5.085	1.287	121
Glass	5.122	1.369	123
Grapes	5.090	1.401	122

Post-hoc comparisons - PQ

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.129	0.151	-0.857	-0.110	0.668
	Grapes	0.035	0.151	0.230	0.030	0.971
Glass	Grapes	0.164	0.151	1.087	0.139	0.523

ANCOVA - PT

Cases	Sum of squares	df	Mean square	F	p	η^2
Version	8.205	2	4.102	3.539	0.030	0.012
WWP	282.027	1	282.027	243.267	< .001	0.397
Residuals	419.678	362	1.159			

Descriptives - PT

Version	Mean	SD	N
Control	4.959	1.428	121
Glass	5.171	1.373	123
Grapes	5.311	1.370	122

Post-hoc comparisons - PT

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.333	0.138	-2.412	-0.309	0.043
	Grapes	-0.301	0.138	-2.180	-0.280	0.076
Glass	Grapes	0.032	0.138	0.230	0.029	0.971

Post-hoc comparisons - WTT

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.750	0.538	-1.394	-0.441	0.351
	Grapes	-1.150	0.538	-2.137	-0.676	0.091
Glass	Grapes	-0.400	0.538	-0.743	-0.235	0.739

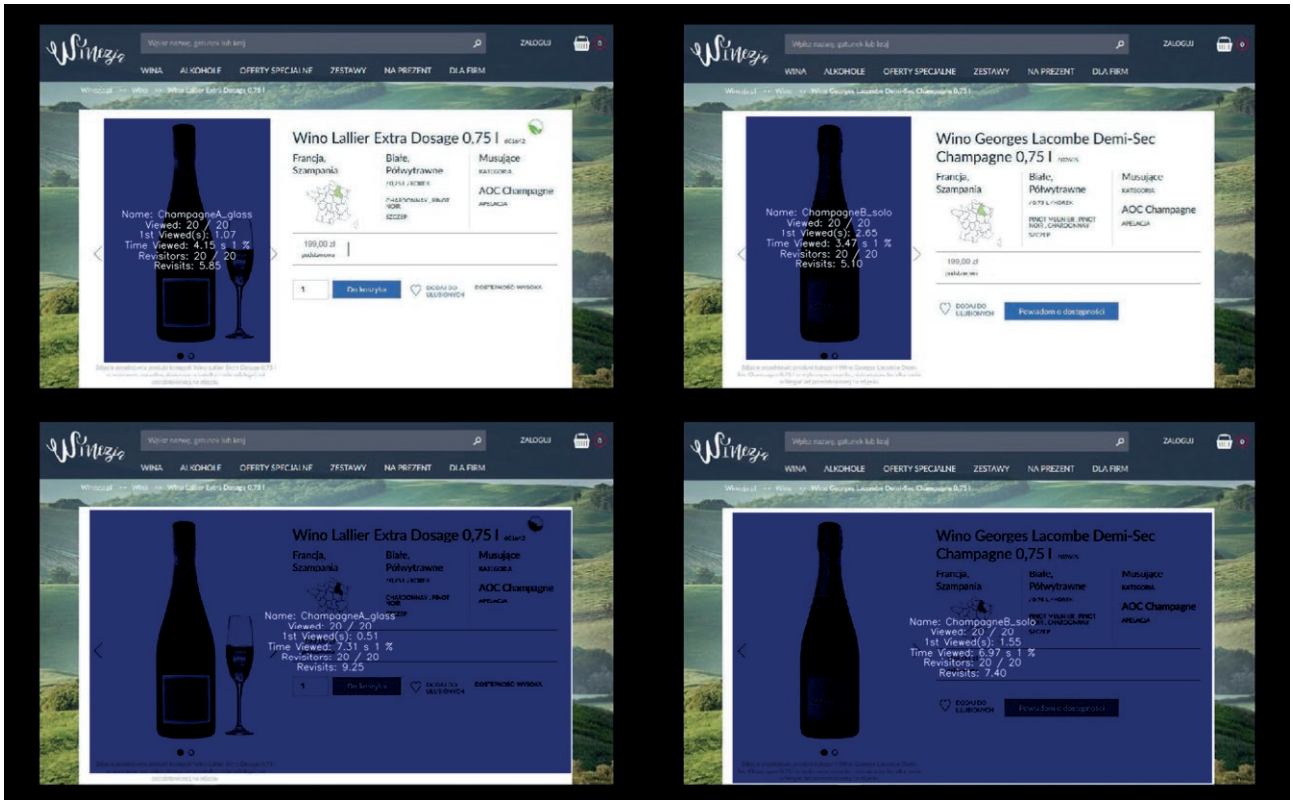
Post-hoc comparisons - UTB

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.750	0.415	-1.806	-0.571	0.177
	Grapes	-1.100	0.415	-2.648	-0.837	0.028
Glass	Grapes	-0.350	0.415	-0.843	-0.266	0.678

Post-hoc comparisons - WTB

		Mean difference	SE	t	Cohen's d	$p_{\text{-Tukey}}$
Control	Glass	-0.550	0.429	-1.283	-0.406	0.410
	Grapes	-1.500	0.429	-3.500	-1.107	0.003
Glass	Grapes	-0.950	0.429	-2.217	-0.701	0.077

APPENDIX 2. AREA OF INTERESTS RESULTS



AOI Study 2B (variant 1)

AOI Study 2B (variant 2)

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Dominici, A., Gerini, F., & Casini, L. (2024). Analysis of performances and trends of PDO wine producers in large retail chains in Italy. *Wine Economics and Policy* 13(1): 127-140. doi: 10.36253/wep-15926

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Analysis of performances and trends of PDO wine producers in large retail chains in Italy

Andrea Dominici[1], Francesca Gerini[2,*], Leonardo Casini[2]

[1] *Department of Land, Environment, Agriculture and Forestry, University of Padua, Via dell'Università, 16, 35020 – Legnaro (PD), Italy*
[2] *Department of Agriculture, Food, Environment and Forestry (DAGRI), University of Florence, Piazzale delle Cascine, 18, 50144 – Florence, Italy*
Email: andrea.dominici@unipd.it; francesca.gerini@unifi.it; leonardo.casini@unifi.it
*Corresponding author.

Abstract. The large retail chains represent the main distribution channel for wine sales in Italy. Retailers, therefore, define the wine supply of their points-of-sale based on their own commercial strategies, taking into account evolving consumer demand, producer characteristics, and product types. Wine bottles from different producers with varying characteristics, sales performances, and commercial trends can be found on shelves next to each other. The aim of this study is to investigate the performance of various producers whose wines were sold in large retail chains in Italy before the pandemic. This analysis enabled us to observe market trends without disruptions. We focused on the two most sold Protected Designation of Origin (PDO) wines, Chianti DOCG and Montepulciano d'Abruzzo DOC. For this purpose, cluster segmentation was implemented using variables related to sales (value of sales, number of labels, average price, discount units, discount percentage, units sold above a certain price), and sales trends of each producer present in large retail chains with these products. The results show that, although there are different trends and commercial strategies among the producers of each of the two denominations of origin, there are similarities between the clusters of the two different denominations. In particular, in the domain of large-scale retail, wine sales are dominated by a few wineries with a strategy based on high sales volume, a wide range of labels, low prices, and promotional sales. The remaining sales refer to wines from producers with different characteristics that record positive sales trends and producers characterised by the declining value of sales. The identified results provide valuable insights for a better understanding of the dynamics of the large retail chain in Italy.

Keywords: scanner data, PDO wines, Chianti DOCG, Montepulciano d'Abruzzo DOC, market segmentation.

1. INTRODUCTION

Over time, large retail chain (LRC) in Italy has gained an increasingly important role in the wine market, representing the main distribution channel for domestic sales of the most important wineries [1,2]. Numerous domestic and international producers are therefore competing for space on supermarket shelves. However, the presence of wines in LRC is influenced by

both the policies and commercial strategies of the distribution system and the characteristics of the producers and the type of product made [3]. In their search for wine supply, LRCs have to deal with a complex competitive landscape ranging from large companies producing numerous labels to small producers of few niche wines. Retailers choose the wine assortment in stores according to their business strategies, which in most cases are based on the listed retail "margin", thus an economic motivation as a result of sales and profit [4]. To optimise economic performances and reach target volumes, supermarkets therefore resort to specific pricing policies, setting prices more competitively than other shops and utilizing promotional sales [5-8].

However, expanding the criteria for selecting producers and products may enable retailers to enhance store loyalty by creating and strengthening a distinct store image [9]. Goodman and Habel [4] have shown that, in addition to economic "margin", other factors contribute to large retailers' choice of wine bottle supply, such as the presence of awarded wines and customer demands. Consumer demand for wine has strongly changed in recent years [10-12], but it seems to have polarised towards two purchasing behaviours [6]. On the one hand, a segment of consumers bases its choices mainly on price. On the other hand, the demand of another segment of consumers is directed towards higher quality standards [13]. While the former segment finds an answer in competitive prices and promotional sales, the latter type seeks higher-quality wines with recognisable cues such as denomination of origin or awards [14-17].

To meet evolving consumer demand and satisfy the segment of customers interested in higher quality products, retailers have reorganised their wine supply over time, increasing the number of labels on the shelves and focusing on high-quality cues such as denominations of origin. In 2017, sales of wine with geographical indication accounted for the majority value of still and semi-sparkling wine sales in LRC (80% of the total). Within this category, PDO wines accounted for 54% of sales, while Protected Geographical Indication (PGI) wines made up 26% [2]. These data are even more interesting when analysed over the long term: the value of sales of PDO and PGI wines progressively increased between 2009 and 2017, by 22.8% and 9.7%, respectively [2]. This quantitative and qualitative reassortment has broadened the range of wine suppliers that retailers have sought out. Traditionally, LRC has favoured partnerships with large wine producers, characterised by high production volume, a wide assortment, and established brand recognition. These large producers, whether private companies or cooperatives, are well organized structurally and have financial resources that allow them to interact directly with the final distributor, thereby reducing the need for intermediaries, which are often essential for smaller businesses. Moreover, these large wine producers find in LRC an optimal sales channel, also because with their strong brands they can create a solid bond of loyalty with final consumers [18]. However, the qualitative diversification of retail assortments towards wines with geographical indications has provided smaller producers with opportunities to access supermarket shelves, albeit often limited to a local scale or within the producer's geographic area. These include producers who previously exclusively targeted other distribution channels, as well as small- to medium-sized producers with limited production and lesser-known brands, who had never engaged with LRC due to the risk of seeing their bottles unsold for a long time [19].

Given the increasing significance of sales of wines with geographical indications in LRC, this study wants to investigate the characteristics of PDO wine producers by identifying and analysing their commercial performances. In particular, this study seeks to address the following research questions: i) among PDO wine producers, is it possible to identify homogeneous groups sharing same sales performances and strategies? ii) How do these groups differ in terms of sales prices, sales values, and discount percentage? iii) What sales performances and price trends have characterized these groups over time? Using sales data of LRC in Italy spanning from 2009 to 2017, the focus is on producers of the two most sold PDO wines in Italian LRC: Chianti DOCG (Controlled and Guaranteed Designation of Origin) and Montepulciano d'Abruzzo DOC (Controlled Designation of Origin). This approach enables an evaluation of both the performances of producers within the same denomination, providing a comprehensive overview of each denomination, and an assessment of whether there are shared dynamics and strategies among producers of different denomination wines in LCR. The performances and strategies of producers were investigated through Hierarchical Cluster Analysis (HCA) using scanner data sourced from Infoscan Census, the retail tracking service of the IRI company. Specifically, sales of still and semi-sparkling wine made during the period January 2009 to December 2017 were gathered and classified. The stable period before the pandemic, with few significant disruptions, allowed us to analyse wine sales in Italian LCR and to observe market trends driven by demand, supply, and corporate strategies without distortion.

This research enriches the existing literature by offering insights into the supply of denomination wines through the analysis of real nine-year sales data achieved in the main wine distribution channels [1]. Few

studies have comprehensively analysed the dynamics of wine sales from various producers within LRC in an aggregated manner. The findings offer valuable insights for all the stakeholders involved in the wine chain, highlighting the strategies and performances that have proven most successful in driving consumer purchases over a nine-year period in LRC.

The remainder of the paper is organised as follows. Following the introduction, we present a literature review on wine sales in LRC and illustrate the case study that served as the basis for our analysis. Subsequently, we detail the methodology employed and present the study's results. Finally, in the "Discussion" and "Conclusions" sections, we analyse the findings, discuss their managerial implications, and address any encountered limitations.

2. THE WINE SALES IN LRC

Consumers have various options for purchasing wine, but LRC in Italy is steadily growing in importance. As previously mentioned, the majority of wine sales (38.8%) occur in LRC, surpassing the second-largest channel, hotels/restaurants/cafés (HoReCa), by more than double, accounting for 17.1% of total sales. The relevance of LRC is underscored by the growth in the value of sales, which for still and semi-sparkling wines rose from 1.422 to 1.604 million euros in the period 2009-2017, representing a growth of approximately 13% [2].

The success of wine sales in LRC can be attributed to the features of this channel, as well as its ability to meet consumer needs. Firstly, consumers appreciate the convenience of buying all their groceries in one place [20]. In this regard, LRC represents an ideal location for buying wine alongside other grocery items [21]. Additionally, LRC has considerably expanded its wine supply, now offering a great selection of products in terms of both price and quality [22]. For example, between 2009 and 2017, the number of European Article Number (EAN) codes for still and semi-sparkling wines sold in Italian LRC increased by 8.5%, from 20,533 to 22,273 labels [2]. LRC increasingly prioritize wine visibility in stores, showcasing bottles prominently on shelves or in specially demarcated areas within the wine department [18]. Moreover, LRC has enhanced the customer interaction by training staff to provide advice on wine tasting and food pairings. In this direction, an Italian supermarket chain has introduced a virtual sommelier in their stores, a digital totem that recommends wine purchases tailored to consumers' preferences or needs. [23].

Among all the distribution channels, the extensive selection offered by LRC is highly valued by low-involvement consumers [24-25]. These consumers consider price-based cues the most important determinants in purchase decision [26], and LRC typically offer more competitive prices compared to other retailers [6]. Moreover, special offers or other types of price promotion are sale strategies typically employed by LRC [7]. According to Casini et al. [27], price cutting is the most common promotion strategy for wine, with discounts ranging from 10% to 50% off the original price, while other forms of discounting like "Buy one get one free" or "Buy-two-get-third-free" promotions are less common. Discounted products are often displayed for easy access and high visibility, using end of aisle gondolas or special mark on the labels. Price discounts have a high impact on consumer choice [28], especially among low-involvement wine consumers [29].

Meanwhile, the wide array of options available at LRCs satisfies consumers seeking for higher-quality wines with recognisable cues, such as denomination of origin, awards, or sustainability attributes [14-17, 30]. As outlined earlier, the sales value of PDO and PGI wines has shown a consistent upward trend in LRC, with PDO accounting for more than half of the total sales value [2]. Moreover, the study of Di Vita et al. [31] further underscores the significant role of modern distribution channels in the purchase of both PDO and PGI wines, as well as basic wines.

Socio-demographic and individual characteristics also influence the choice of the distribution channel for wine purchases. In a study of the UK market, Ritchie [29] found that women prefer purchasing wine in supermarkets, whereas men prefer specialized wine shops. Generation Z members (those born after 1996) and Millennials (those born between 1981 and 1996) consider supermarkets their favourite channel for buying wine [32,33]. In a cross-country study on wine purchasing behaviour in Germany and Hungary, Szolnoki and Totth [34] found that wine consumers with higher incomes tend to purchase minimal wine from discount stores and spend more money on wines sold at wine stores or bought directly from wineries. Conversely, wine drinkers from lower social classes typically buy wine from grocery stores. The greater variety of wines and brands available on LRC shelves makes it an appropriate distribution channel for consumers seeking novelty or those inclined towards switching behaviours [35].

3. CASE STUDY

Chianti DOCG and Montepulciano d'Abruzzo DOC emerge as the most sold PDO still wines in Italian LRC. Our analysis of IRI Infoscan Census data reveals that Chianti DOCG wine consistently ranks as the highest-

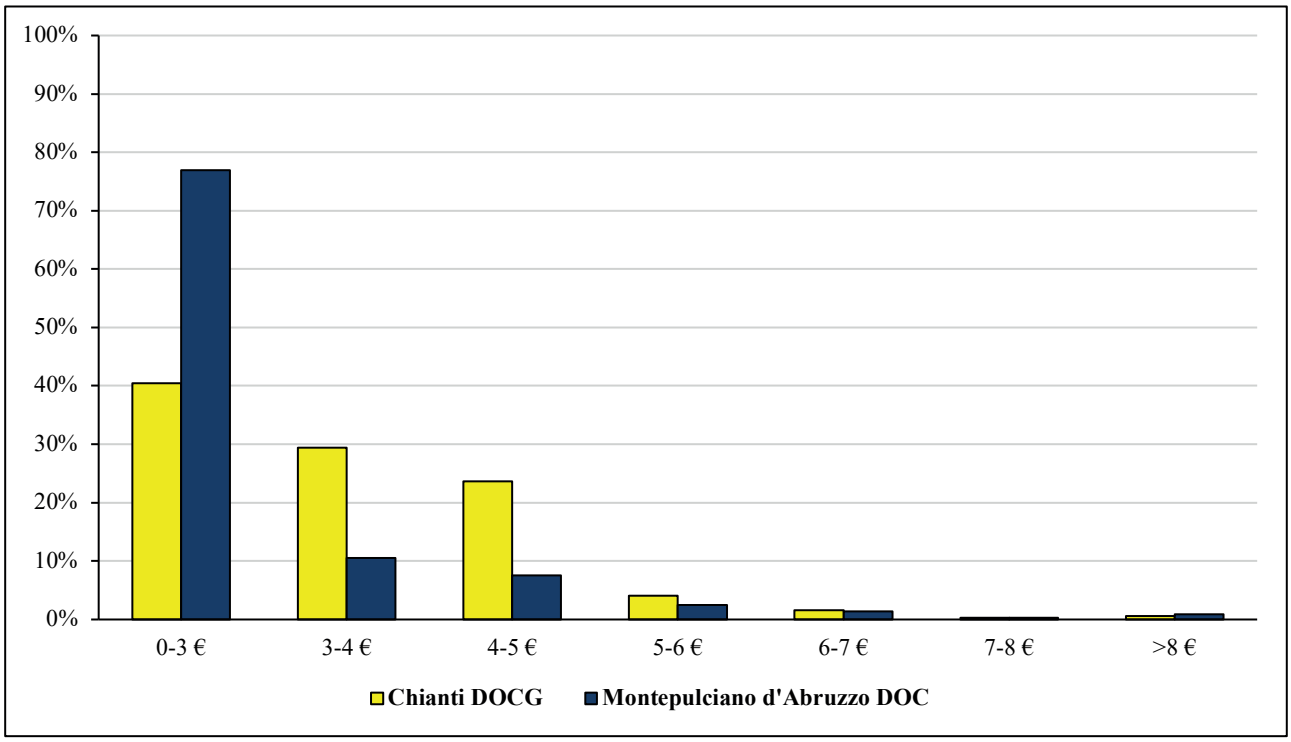


Figure 1. Distribution of sales in units (percentage of the respective denomination) by price range of 0.75-litre bottles of Chianti DOCG and Montepulciano d'Abruzzo DOC (year 2017). Note: Our elaboration on IRI data.

selling denomination in terms of value at Italian LRCs from 2009 to 2017, with sales revenues reaching 46.2 million euros in 2017 (equivalent to 5.38% of total DOC/DOCG wine sales) and experiencing a 21.9% increase in sales value over the period. Montepulciano d'Abruzzo DOC follows closely as the second most sold denomination in LRC, generating total sales of 32.4 million euros in 2017 (3.78% of total DOC/DOCG wine sales) and witnessing a 3.4% increase in sales value from 2009 to 2017.

Chianti DOCG wine, made with at least 70% Sangiovese grapes, is a red wine produced in a vast territory in the centre of the Tuscany region. As of 2017, the vineyards dedicated to Chianti DOCG covered 14,266.30 hectares [36]. On the other hand, Montepulciano d'Abruzzo DOC wine is a red wine produced in the coastal hills and foothills of the Abruzzo region. The specification of the denomination, recognised in 1968, requires wines to be made from at least 85% Montepulciano grapes. In 2017, there were 9,325.13 hectares belonging to the Montepulciano d'Abruzzo DOC area [37].

According to ISMEA [38], in 2017 Montepulciano d'Abruzzo DOC and Chianti DOCG ranked as the most produced still PDO wines in Italy in terms of volume. Montepulciano d'Abruzzo DOC stood as the second most produced appellation after Prosecco DOC (the most produced semi-sparkling or sparkling PDO wine in Italy), with a total volume of 834,466 hectolitres, accounting for 5.5% of the total PDO wine production. Chianti DOCG was the third most produced PDO wine, with a volume of 751,334 hectolitres, representing 4.9% of the total PDO wine production.

In terms of sales in supermarkets by format in 2017, Chianti DOCG wine was exclusively sold in glass bottles in accordance with production regulations. The majority of unit sales were attributed to 0.75-litre glass bottles (96.2% of the total sales), with a smaller portion sold in 1.5-litre glass bottles (1.2% of the total sales).

Montepulciano d'Abruzzo DOC wine was predominantly sold in glass containers (99.6% of total units sold), with only a minimal percentage sold in 3-litre or 5-litre bag-in-box formats (0.4%). Within glass sales alone, the majority were in 0.75-litre bottles (89.8% of total units sold) and 1.5-litre bottles (6.1% of total units sold), with a smaller proportion in 5-litre containers (3.4%).

The analysis of IRI Infoscan Census data for 2017 reveals that the average price paid by consumers, inclusive of promotional sales, was 3.57 euros for a 0.75-litre bottle of Chianti DOCG and 2.82 euros for a bottle of Montepulciano d'Abruzzo DOC. Figure 1 shows the distribution of unit bottle sales for Chianti DOCG and

Montepulciano d'Abruzzo DOC across various price ranges in 2017. As regards Chianti DOCG, the majority of sales fell within the under 3 euro range (40.5% of the total), followed by the 3-4 euro range (29.4%) and the 4-5 euro range (23.7%). Sales in the 5-6 euro range constituted 4.1% of total sales, while those above 6 euros accounted for only 2.4% of the total. In contrast, sales of Montepulciano d'Abruzzo DOC were heavily concentrated in the under 3 euro range, comprising over three-quarters of total sales (76.9%). The remaining sales were primarily distributed between the 3-4 euro range (10.5%) and the 4-5 euro range (7.5%), with only 5.0% sold in the over 5 euro range. An initial analysis of sales value in 2017 at LCR reveals a highly concentrated market for both denominations. For Chianti DOCG, the top five producers collectively accounted for 47.4% of the total sales value, a percentage that rose to 67.5% when considering the top ten producers. In the case of Montepulciano d'Abruzzo DOC, market concentration among a few key producers was even more pronounced, with the top five producers representing over half of total sales value (58.8%), and the top ten accounting for 75.9% of the total.

4. METHOD AND MATERIALS

The analysis of wine sales trends from 2009 to 2017 related to the Chianti DOCG and Montepulciano d'Abruzzo DOC denominations was conducted using a database containing scanner data sourced from IRI Infoscan Census. This database encompasses sales of both still and semi-sparkling wines throughout Italy, specifically in LCR, which includes hypermarkets, supermarkets, self-service stores (superettes + minimarkets), and discount stores. Store scanner data are collected at cash registers and identify each product sold, defined by an EAN code. For each EAN code, the database reports information such as year and month of sales, brand, producer, type (still or semi-sparkling), colour (red, white, or rosé), geographical indication, format type and volume, and the main grape variety.

To describe and analyse producers' performances and strategies, nine variables were created by processing the available data in the database. These variables concern i) the dimensional aspects of sales (grouped under "Dimensions"); ii) the "Commercial strategies" applied; and iii) the "Dynamic performances" in the period considered for each producer. Each variable pertains to the aggregate volume of wine labelled with the same geographical indication (Chianti DOCG or Montepulciano d'Abruzzo DOC) and sold by individual producer within this commercial channel. The details of the variables are outlined in Table 1.

Table 1. Variables referred to each producer and categorised by "*Dimensions*", "*Commercial strategies*" and producers' "*Dynamic performances*".

Variables	Description and unit of measure
Dimensions	
SALESVALUE	Average annual value of wine sales (€)
EAN	Average annual number of labels (n°)
Commercial strategies	
UNITPROMO	Percentage of bottles sold in promotion (%)
PRICE	Average annual price (€/bottle)
DISC	Average percent discount on price (%)
UNITOVER	Percentage of units sold above a specific price (%)
Dynamic performances	
TRENDVALUEPROMO	Trend in value of annual sales in promotion (%)
TRENDVALUENOPROMO	Trend in value of annual sales not in promotion (%)
TRENDPRICE	Annual price trend considering total sales (€/bottle)

In the "*Dimensions*" category, the variable "SALESVALUE" denotes the average annual value of wine sales in euro, considering only the years in which the wine was sold in LCR. This variable encompasses all sales, including both those at the base price and those at promotional price. This variable is obtained by dividing the sum of the annual sales value of each producer by the number of years each producer has been present in LCR during the reference period. Given that each producer may offer different wine labels of the same denomination, the variable "EAN" measures the average annual number of different labels sold belonging to the same denomination. This variable is obtained by dividing total number of labels of each producer present on the shelves of LCR each year by the number of years each producer has been present in the LCR during the reference period.

The "*Commercial strategies*" group includes "UNITPROMO", indicating the percentage of units sold during promotional sales out of the total units sold. This variable is obtained by dividing the total number of units sold on promotion by each producer each year by the total number of units sold by each producer during the reference period. "PRICE" identifies the average annual price per bottle in euro calculated across total sales. This variable is derived by dividing the sum of the sales value for each year of each producer by the total number of units sold by each producer within the

reference period. "DISC" represents the average percentage discount on the sales price. This variable is obtained by dividing the difference between the average bottle price (of total sales) and the average promotional bottle price of each producer by the average bottle price (of total sales) of each producer during the reference period. "UNITOVER" refers to the percentage of units sold above a designed threshold price, computed considering the average sales price in the 75th percentile for each denomination. For Chianti DOCG, this threshold price was set at 6 euros, while for Montepulciano d'Abruzzo DOC, it was 9 euros. This variable is obtained by dividing the total number of bottles sold above the threshold by each producer by the total number of bottles sold by each producer during the reference period.

Lastly, the three dynamic variables grouped under "*Dynamic performances*" were measured only for the years in which sales occurred on the market. Specifically, "TRENDVALUEPROMO" and "TRENDVALUENOPROMO" indicate the average percentage variation recorded from 2009 to 2017 for promotional and non-promotional sales value, respectively. These two variables were estimated by performing linear regressions of the percentage of promotional/non-promotional sales on total sales over the years. Similarly, "TRENDPRICE" represents the average change in the average annual price per bottle in euros, estimated by a linear regression of the average annual price per bottle across the selected years.

The selected variables allow us to construct a comprehensive overview of wine producers' primary sales data. This facilitates a thorough examination of their performance and sales strategies, enabling effective addressing of our research questions.

Before initiating the clustering procedure, we applied exclusion criteria to focus specifically on producers with a sustained and significant contribution to the market within the specified denominations. This ensured the robustness and reliability of the subsequent analyses conducted on the HCAs. Firstly, producers labelled as "*Outgoers*", who did not engage in wine sales within the designated denomination in 2017, were excluded. This group likely comprises producers who, for various reasons, ceased operations with LRC in 2017 or in previous years. Secondly, producers classified as "*Incomers*", who had a presence in the designated denomination for less than four years during the last six years of the reference period (2012-2017), were excluded. These are producers who either did not maintain consistent activity throughout the specified timeframe or entered the market relatively recently."

The created variables were used in the HCA to investigate the existence of homogeneous groups of producers selling the same wine denomination in the LRC. Clustering involves grouping objects into distinct sub-groups characterized by high internal homogeneity and high external heterogeneity [39]. The hierarchical clustering process generates a treelike diagram, known as a dendrogram, which visually represents the combinations and divisions of clusters as they are formed. This dendrogram provides valuable insight into the hierarchical structure of the data and the relationships between clusters, facilitating interpretation [39]. Unlike partitioning methods such as k-means, hierarchical clustering does not require specifying the number of clusters beforehand [39]. Instead, it recursively merges or splits clusters based on a chosen criterion, allowing for a flexible and data-driven approach to clustering.

HCA was performed using Ward's method and squared Euclidean distance matrices. Starting from each producer considered as an individual cluster, Ward's method sequentially merges the two most similar clusters that minimize the increase of the total sum of squares across all variables within all clusters [40]. The Ward's method, in conjunction with the utilization of squared Euclidean distance, presents several advantageous features for cluster analysis. Unlike methods solely reliant on optimizing distances between clusters, Ward's method prioritizes enhancing clusters' homogeneity by minimizing the increase in the error sums of squares of deviations from the centroids of the clusters. This approach fosters more cohesive and internally consistent clusters [39]. Additionally, it promotes the formation of clusters of approximately uniform size [39]. This feature is particularly advantageous as it contributes to enhancing the interpretability and comparability of resulting clusters, facilitating more meaningful analyses. Squared Euclidean distance is computed by summing the squares of the differences between corresponding coordinates, eliminating the need to calculate the square root. This method offers the advantage of faster computation, as it bypasses the step of taking square roots. It is the preferred distance measure for centroid-based and Ward's methods of clustering due to its computational efficiency and recommended suitability for clustering techniques [39].

To determine the optimal number of clusters, we initially employed a visual depiction of cluster solutions in a dendrogram. Moreover, we estimated the Variance Ratio Criterion, also recognised as the Calinski-Harabasz pseudo-F [41] and Duda-Hart indices [42]. Higher values of both indices indicate a better definition of clusters. Furthermore, the pseudo-T-squared [43] was examined, a transformation of the Duda-Hart index, where a lower value indicates distinct clustering.

All statistical analyses were performed using the STATA 18 software [44].

5. RESULTS

From 2009 to 2017, 212 producers sold Chianti DOCG wine in Italian LRC at least in one year. Among these, 83 producers exited the market ("*Outgoers*") and 19 were newcomers ("*Incomers*"). Subsequently, we excluded these 102 producers from our analysis, narrowing our focus to the remaining 110 producers who consistently sold their wine for a minimum of four years during the period from 2012 to 2017, including the final year of survey, 2017.

For the implementation of the HCA, a five-cluster solution was identified as the best compromise explaining the data based on a combination of fit statistics and dendrogram analysis (Figure 2). The 5-cluster solution has a pseudo-F statistic value of 41.00. Additionally, it exhibits a high Duda-Hart index of 0.763, surpassed only by the 2-cluster solution with an index of 0.791. However, the pseudo-T value for the 5-cluster solution is lower at 14.94 compared to the 2-cluster solution at 24.81. Each segment presents a distinct profile with respect to the variables included in the HCA, and the mean for each cluster is listed in Table 2.

Cluster 1, consisting of 9 producers (8.2% of the sample), comprises producers who, on average, recorded the highest sales value of Chianti DOCG each year and sold the greatest number of different Chianti DOCG labels (around 10). It is therefore referred to as "*Quantity-oriented*". 68% of the Chianti DOCG wine sold by these producers is sold at promotional prices, with an average discount percentage of 9%. The average price is the second lowest among the various clusters, at 3.25 euros per bottle. Only 1% of the units sold by these producers have a price above the threshold. They are characterized by a positive annual trend in both the value of wine sales at the base price (+3%) and at promotional price (+3%), as well as an annual increase in price.

Cluster 2, comprising only 13 producers (11.8% of the sample), records the second-highest sales values of Chianti DOCG, although it is one sixth of those of Cluster 1. The commercial policy pursued by this group is characterized by the lowest average price (2.89 euros), albeit increasing, and the highest percentage of promotion (81% of the total), with an average discount of 7%. Given this inclination towards promotion, it is referred to as "*Promo-oriented*". No units sold by these producers have a price above the threshold and, on average, they sell around two different Chianti DOCG wines. The strategy of these producers seems to be appreciated by consumers, resulting in a positive annual trend in both the value of wine sales at base price (+5%) and at promotional price (+7%).

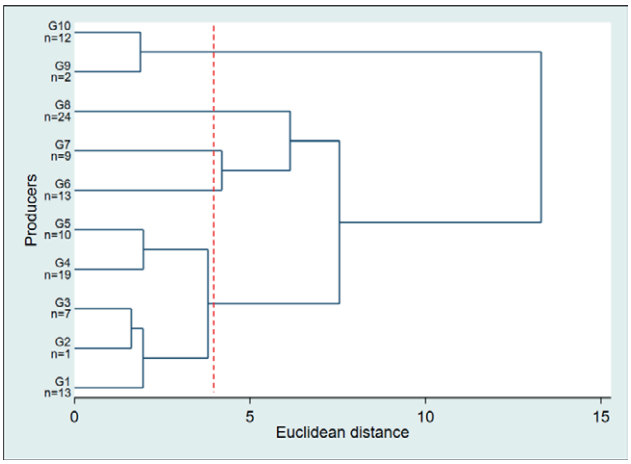


Figure 2. Hierarchical Cluster Analysis dendrogram for Chianti Classico DOCG producers. Note: Our elaboration on primary data.

Cluster 3 includes the highest number of producers (50), accounting for 45.5% of the sample. In this cluster, there are producers who recorded the third-highest average annual sales value (although considerably lower than the "*Quantity-oriented*" and "*Promo-oriented*" clusters), with a percentage of bottles sold at promotional prices equals to 35% of the total and an average discount of 11%. On average, each of these producers sold approximately 1.74 different labels of wine under the Chianti DOCG denomination per year, with 8% of the total bottles sold above the threshold price. The average sales price of wine from this cluster was the second highest in the sample (4.16 euros). These producers show the highest increase in price, alongside a notable decline in the annual sales value of both wine at base price (-11%) and wine at promotional price (-11%). For this reason, this cluster is termed "*Negative performers*".

Cluster 4, conversely, shows the best positive annual trends over the period in terms of both the value of sales at base prices (+26%) and the value of sales at promotional price (+21%), along with a decrease in price. We therefore designate this cluster of producers to "*Best performers*". This cluster consists of 24 producers (21.8% of the sample) with the second-lowest sales value. Units sold in promotions account for 41% of total sales, and the average discount rate is 9%. On average, these producers sell about 1.72 different wine labels under the Chianti DOCG denomination. The average sales price is 3.84 euros, with units sold above 6 euros accounting for only 3% of the total.

Table 2. Mean values of the variables describing each cluster of Chianti DOCG.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Quantity-oriented	*Promo-oriented*	*Negative performers*	*Best performers*	*High-price oriented*
SALESVALUE (€)	2,622,429.73	417,848.38	105,496.88	99,359.05	83,923.37
EAN (n°)	9.88	2.07	1.74	1.72	1.56
UNITPROMO	68%	81%	35%	41%	16%
PRICE (€/bottle)	3.25	2.89	4.16	3.84	8.87
DISC	9%	7%	11%	9%	20%
UNITOVER	1%	0%	8%	3%	88%
TRENDVALUEPROMO	3%	7%	-11%	21%	-5%
TRENDVALUENOPROMO	3%	5%	-11%	26%	15%
TRENDPRICE (€/bottle)	0.08	0.05	0.23	-0.07	0.11
N° PRODUCERS	9	13	50	24	14

Cluster 5, comprising 14 producers (12.7% of the total), is characterised by the lowest sales value in the sample and at the same time by the highest average price, equal to 8.87 euros. In fact, 88% of their products are sold above the threshold price. In light of these characteristics, this cluster is called "*High-price oriented*". Although the average annual discount is the highest (20%), only 16% of the bottles are sold at promotional prices. Moreover, although this cluster is defined by the lowest number of Chianti DOCG labels (1.56), the annual trend of sales value is positive only for wine at base price (+15%), while the annual value of sales at promotional price records a -5%. The price shows a positive trend in the considered period.

Regarding Montepulciano d'Abruzzo DOC, during the period 2009-2017, a total of 168 different producers sold this wine in LRC. Among these, a cluster analysis was undertaken on a subset of 90 producers, excluding 48 producers classified as "*Outgoers*" and 30 as "*Incomers*".

Upon examining the dendrogram (Figure 3) and considering statistical criteria for implementing the HCA, the five-clusters solution emerged as the most suitable option. This solution showed the highest pseudo-F statistic value (28.06) compared to the other solutions, along with a better combination of the Duda-Hart index and pseudo-T value (0.705 and 12.13, respectively). Table 3 displays the average values of each variable used in the HCA implementation along with other descriptive variables.

Cluster 1, consisting of 7 producers (7.8% of the sample), stands out with the highest sales value, significantly larger than other clusters. It is therefore labelled as "*Quantity-oriented*". These producers boast the highest number of labels in the market, averaging 7.30 per year, and the highest percentage of promotional sales

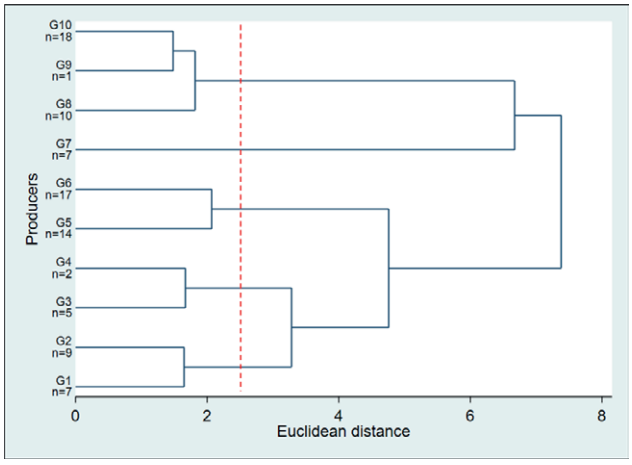


Figure 3. Hierarchical Cluster Analysis dendrogram for Montepulciano d'Abruzzo DOC. Note: Our elaboration on primary data.

(59% of the total). With a sales price of 2.64 euros, the lowest among all clusters, and the highest average annual discount (12%), no units are sold above the threshold price. However, both the value of sales at base price and promotional price exhibit negative annual performances (-3% and -6%, respectively), despite an annual increase in price.

Cluster 2 also exhibits negative trends for both sales value at base price (-6%) and promotional price (-9%), despite an increase in price. This cluster comprises 31 producers, accounting for 34.4% of the sample, with a sales value of approximately 132 thousand euros and an annual average of 2.24 labels sold. Additionally, this group of producers features the second-lowest sales price (2.90 euros per bottle) and no units sold above the threshold price. Around 47% of units are sold on promotional sales, with an average discount percentage of 11%.

Based on these characteristics, we identify this cluster as "*Low-price oriented*".

Cluster 3, encompassing 29 producers (32.2% of the sample), demonstrates the weakest performance in terms of sales value, with a decline of 7% in sales value at base price and 11% at promotional price. Hence, we label this cluster as "*Negative performers*". Each of these producers sells an average of about 1.37 different labels of Montepulciano DOC wine, with only 1% of total bottles sold above the threshold price. Despite an increasing trend, the average sales price is 3.53 euros. Around 11% of total sales come from promotions, with an average discount rate of 5%.

Cluster 4 comprises 16 producers, accounting for 17.8% of the sample. In terms of size, it boasts the second-highest average sales value, albeit significantly lower than the cluster with the highest sales ("*Quantity-oriented*") and offers a range of 4.66 different labels sold. The sales price is the second highest in the sample at 6.45 euros per bottle, with a positive annual increment. Approximately 14% of total sales are above the threshold price. Promotional sales, constituting 31% of the total units sold, feature an average discount rate of 11% and exhibit a positive annual trend (+23%), as does the sales value at base prices (+22%). These trends represent the best performance among all producers in absolute terms, leading us to label this cluster as the "*Best performers*".

Cluster 5 encompasses 7 producers, making up 7.8% of the sample, and is characterised by the lowest average sales value of Montepulciano d'Abruzzo DOC. With an average sales price of 16.12 euros, significantly higher than other clusters, 87% of units are sold above the threshold price. This cluster also demonstrates the highest annual price increase over the nine-year period. Thus, we label it as consisting of "*High-price oriented*" wine producers. Units sold at promotional prices amount to 11%, the lowest value among all clusters, and the sales value at promotional prices decreases by 11% over the period. The average discount rate is 9%. On average, each producer in this cluster sold 2.44 different labels of Montepulciano d'Abruzzo DOC. Despite the small sales value, the sales of wines at base prices show an annual increase of 5%.

6. DISCUSSION

The sales of 0.75-liter bottled wine in LRC from the two denominations during the period 2009-2017 exhibited divergent trends. Sales of Chianti DOCG showed a growing trend with an annual average of 4%, exceeding those of Montepulciano d'Abruzzo DOC with an annual average of 2%, thus reflecting the production volume trends of the two consortia (3% and 2%, respectively) [45].

The analysis of sales data allowed for the identification of groups of producers with homogeneous performances and sales trends within the two most marketed denominations of origin. The results of the HCA revealed the presence of five clusters of producers for both Chianti DOCG and Montepulciano d'Abruzzo DOC.

Primarily, our analysis highlights significant differences in performance between the two denominations in LCR. Among the identified clusters, 55.5% of Chianti DOCG producers, excluding one cluster, exhibit positive trend performances for sales at base price. In contrast, only two clusters of Montepulciano d'Abruzzo DOC producers show increments in sales at base price. Notably, approximately two-thirds (74.4%) of Montepulciano d'Abruzzo DOC producers, spanning three different

Table 3. Mean values of the variables describing each cluster of Montepulciano d'Abruzzo DOC.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Quantity-oriented	*Low-price oriented*	*Negative performers*	*Best performers*	*High-price oriented*
SALESVALUE (€)	2,037,629.95	131,715.72	61,243.83	165,508.76	18,290.50
EAN (n°)	7.30	2.24	1.37	4.66	2.44
UNITPROMO	59%	47%	11%	31%	11%
PRICE (€/bottle)	2.64	2.90	3.53	6.45	16.12
DISC	12%	11%	5%	11%	9%
UNITOVER	0%	0%	1%	14%	87%
TRENDVALUEPROMO	-6%	-9%	-11%	23%	-11%
TRENDVALUENOPROMO	-3%	-6%	-7%	22%	5%
TRENDPRICE (€/bottle)	0.13	0.10	0.10	-0.05	0.27
N° PRODUCERS	7	31	29	16	7

clusters, experience an annual decrease in the value of all types of sales.

The comparison among producers of both denominations reveals divergent consumer purchasing behaviours: one segment bases its choices mainly on price, while another seeks higher quality standards [6,13]. The wine sales are dominated by a limited number of large companies offering several labels (EAN) at competitive prices. These are wineries belonging to the "*Quantity-oriented*" cluster, identified for both PDO wines. Additionally, the "*Promo-oriented*" cluster of Chianti DOCG, characterized by the lowest sales price, can be included in this group. Together, these clusters encompass 22 producers for Chianti DOCG and 7 for Montepulciano d'Abruzzo DOC, representing 76% and 62% of the value of sales, respectively. These producers, predominantly cooperatives or consortia of cooperatives, or companies primarily engaged in bottling, typically offer a high number of labels at lower average prices, facilitated by extensive promotional sales. However, performance differences between the two denominations are notable, with positive performance improvements observed for Chianti DOCG clusters, while Montepulciano d'Abruzzo DOC clusters show negative trends. Although these differences in performance of each denomination, these results seem to confirm that LRC is an optimal sales channel for large wine producers. These products allow LRC to adopt specific pricing policies that, also through promotions, are appreciated by consumers [6,7,18].

Additionally, clusters characterized by limited sales in quantity, but high unit value are observed for both denominations. These clusters, named "*High-price oriented*", exhibit the highest average sale prices and recorded significant sales increases, indicating growing consumer interest in quality wines in this sales channel. These results suggest an increasing preference among consumers for wines from these producers, particularly those associating product quality with higher prices [46,47]. These small producers of high-quality wines are considering the LCR as an increasingly interesting channel for selling their products when facing difficulties in other commercial outlets [48].

However, the majority of wine producers in both denominations belong to other clusters, characterized by sales values around 100,000 euros and intermediate prices. These producers differ primarily in dynamic performance over the period. The first type includes "*Best performers*", exhibiting the greatest annual increases in sales value at base price and promotion, particularly notable for Montepulciano d'Abruzzo DOC. "*Best performers*" producers of both denominations show prices above the average, 3.85 euros for Chianti DOCG and 6.45 euros for Montepulciano d'Abruzzo DOC. These producers, with prices above the average, maybe offering the most appreciated wines by consumers, although further studies are warranted for a better understanding. It is conceivable that consumers purchase wine from these producers for characteristics not considered in this study, such as brand, awards, recognisability in certain markets, or other characteristics considered signs of quality [11,17,49,50].

On the other hand, the second type consists of "*Negative performers*" producers, accounting for a substantial portion of both denominations (46% of Chianti DOCG producers and 32% of Montepulciano d'Abruzzo DOC producers). Despite similarities with the previous type, they demonstrate opposite market trends in sales. Negative sales trends are also performed by "*Low-price oriented*" producers of Montepulciano d'Abruzzo DOC, which show some common traits with the "*Negative performers*" producers. These performances may suggest several interpretations. On the one hand, these results could indicate that, despite a slightly higher price than that of "*Quantity-oriented*" producers, the limited brand strength and low appeal of "*Negative performers*" wines means that consumers are turning to bottles from other producers. Another aspect to be considered is that these producers or the distribution chains, due to their own commercial and distribution strategies, have chosen to reduce sales of these products in LRC. For example, producers may have allocated more wine to other distribution channels, such as HoReCa or export. Similarly, LRC may have reduced its supply relationships with these producers, preferring others. This reduction in supplies could therefore be translated into a lower presence on the shelves and consequently less purchases by consumers. Given the numerical relevance of these producers on the total of the respective denominations, further studies with direct investigations on these producers are needed to understand if this decline in the market could constitute a critical situation or only a dynamic towards more advantageous channels.

The analysis underscores the significant role of large producers/bottlers in dominating the market with basic wines priced below 5 euros per bottle (93% and 95%, respectively, of unit sales of Chianti DOCG and Montepulciano d'Abruzzo DOC). The decisive weight of the large producers/bottlers is therefore also evident. For both denominations, they represent almost the entire supply in LRC, although with different trends between Chianti DOCG and Montepulciano d'Abruzzo DOC. Considering that it is not easy for producers to receive a fair remuneration for denomination wines with a price below 5 euros [51,52], the decisive role of large produc-

ers/bottlers is evident. In fact, the higher volumes of wine they can produce enable them to dominate the shelves with lower prices, thanks to contained production costs resulting from the economies of scale they benefit from.

However, there is also a trend of increasing sales of the high-quality segments of the two denominations, although the data collected showed non-homogeneous trends especially for wines with intermediate prices. In general, these products are offered with average values of about 100,000 euros per producer and therefore, probably, representing only a part of the total production of each winery, they can easily be adapted to different trends in demand.

Promotional sales play a crucial role in supermarkets, especially for "*Quantity-oriented*" and "*Promo-oriented*" producers. Where it is matched by an increase in value of sales, this appears as an example of strategy to pursue. However, price promotions could have several negative effects, especially when margins fall below a certain threshold, or when annual sales fall, as is the case for "*Negative performers*". In such situations, producers could explore alternative forms of promotion with retailers besides simple price cuts [8]. By doing so, producers may have the opportunity to improve their sales without jeopardizing their profit margins.

Furthermore, the high turnover of producers in the LRC over the nine-year period is worth considering. Specifically, there were 19 "Incomers" and 83 "*Outgoers*" for Chianti DOCG, and 30 "*Incomers*" and 48 "*Outgoers*" for Montepulciano d'Abruzzo DOC. This suggests that, in the long-term, while there is space for new producers, others may exit the channel due to various strategic reasons. The reasons, which may depend on both producers' and distributors' strategies, were not investigated in this study and would be an interesting topic for future work.

7. CONCLUSIONS

This research provides an examination of the dynamics characterizing the Chianti DOCG and Montepulciano d'Abruzzo DOC wine markets within the Italian LRC spanning a nine-year timeframe (2009-2017), and consequently sheds light on the trends within this significant distribution channel for wine. The research focuses on examining the behaviour of producers within distinct clusters, elucidating their sales strategies, pricing policies, and performance trends over time.

This timeframe enabled us to analyze a substantial dataset spanning nearly a decade, providing a comprehensive understanding of trends and patterns in wine sales in LCR over a significant period. Additionally, by selecting a wide time horizon, we aimed to capture both short-term fluctuations and long-term trends in the wine market, thereby enhancing the robustness and reliability of our analysis. Moreover, sales referring to the years before the pandemic are not influenced by the exceptional dynamics that occurred [53], such as the surge in online sales. Therefore, the study conducted analyzes the evolving situation preceding the pandemic, highlighting dynamics that may reassert themselves or be overturned after the shock that occurred in 2020 [54]. Accordingly, even though the data used for the analysis pertain to a recent past, the analysis conducted within the Italian LRC can offer valuable insights for today's PDO wine producers, highlighting the importance of strategic planning in response to evolving consumer preferences and market dynamics. Producers can use the cluster analysis results to tailor their marketing and sales strategies, focusing on price competitiveness, product quality, and promotional tactics.

The wine market in Italian LCR for both Chianti DOCG and Montepulciano d'Abruzzo DOC wines is largely dominated by a few major producers (less than 10 for each denomination), characterized by low prices and a wide range of labels, collectively representing approximately 60% of the total annual sales value. The role of these large-scale producers appears to have reached a level of saturation, while types of producers with smaller-scale operations but higher qualitative aspects exhibit growing trends. More specifically, the majority of Montepulciano d'Abruzzo DOC producers demonstrate negative performance compared to Chianti DOCG producers. The disparities between the two denominations may be attributed to their respective brand image. This suggests that, in general, additional investment in enhancing the reputation of the Montepulciano d'Abruzzo DOC may be advisable. In this regard, certain changes to production regulations were approved in 2023, including the introduction of new subzones. However, there appears to be potential for market penetration in LCR among producers offering smaller quantities of products with unique characteristics perceived as quality traits by consumers, who could also consider higher prices as quality signals. This holds particularly true for the Montepulciano d'Abruzzo DOC denomination, where producers of medium to high-priced wines experienced positive sales trends over the study period. Producers capable of meeting the minimum quantity requirements of supermarkets should consider forming partnerships, especially at the local level, with distribution chains. However, accessing the supermarket shelf may prove challenging if the route involves numerous commercial

intermediaries, adding further complexity to the process. Therefore, producers must assess the feasibility of navigating such intricate pathways to market.

The findings of this study reflect discernible trends in the demand for wine among Italian consumers, notably indicating an uptick in the consumption of quality wines in the medium to high price range, consistent with previous research [2,6,55]. It should be considered that this study specifically analyses consumption patterns for two denomination wines positioned at the top of the wine quality hierarchy. Thus, the observed trend underscores a further preference shift towards higher quality wines within the same denomination [56].

This study is a starting point for future research that can deeper investigate the characteristics of producer clusters employing successful strategies in LRC, employing more nuanced analyses and alternative methodologies. Complementing quantitative analysis with qualitative research methods, such as interviews or focus groups with producers and retailers, could offer deeper insights into the drivers of market trends, producer decision-making processes, and consumer perceptions. Future studies could address the limitations of this research and expand upon its findings by examining consumption patterns during and post-COVID-19 pandemic periods, potentially utilizing time series prediction models.

This study is not without limitations. This study is not without limitations. Firstly, the wine sales data utilized for our analysis are limited to a specific period and pertain to a recent past, predating the COVID-19 pandemic. The aim of our study is to provide an examination of long-term trends and patterns in wine sales unaffected by the extraordinary circumstances of the COVID-19 pandemic. Therefore, to offer insights into the evolving dynamics of the wine industry, future studies should include more recent data. The study focused primarily on sales performance metrics and trends, overlooking other factors that may influence producer success, such as brand reputation, marketing strategies, and production practices. Future research could adopt a more holistic approach to capture a broader range of variables. One notable aspect not accounted for is the presence of organic certification on bottles. Although organic wine accounts only for a small percentage of sales in supermarkets [15], it shows increasing purchase rates and seems to be increasingly appreciated by consumers. Furthermore, the study's focus solely on sales of 0.75-litre bottled wine from two prominent Italian denominations. For this reason, it does not detect trends in the strategies of wine producers of other denominations or of wines of lower quality and in other formats. Additionally, reliance on IRI's data means trends in sales through other channels, such as online shops or restaurants, are not addressed.

FUNDING

This work was supported by UNICESV, Centro universitario di Ricerca e Formazione per lo sviluppo competitivo delle imprese del settore vitivinicolo italiano.

REFERENCES

[1] Mediobanca, Indagine sul settore vinicolo. https://www.areastudimediobanca.com/it/catalogo/tipologia/indagine-sul-settore-vinicolo/, 2019 (accessed 10 March 2024).

[2] L. Casini, V. Alampi Sottini, A. Dominici, S. Fabbrizzi, F. Gerini, C. Romano, Il Mercato del Vino nella Grande Distribuzione Organizzata in Italia. Tendenze 2009-2017 e Previsioni, Firenze University Press, Firenze, 2000. DOI 10.36253/978-88-5518-056-6

[3] M. Gregori, L. Galletto, G. Malorgio, E. Pomarici, L. Rossetto, Il Marketing del Vino, EdiSES, Napoli, 2017.

[4] S. Goodman, C. Habel, C. Australian off-premise: What influences their wine buying decision?, Aust. N.Z. Grapegrow. Winemak. 598 (2013) 98-100.

[5] E. Pomarici, F. Boccia, D. Catapano, The wine distribution systems over the world: An explorative survey, New Medit 11 (2012) 23-32.

[6] C. Contini, C. Romano, G. Scozzafava, F. Boncinelli, L. Casini, Wine consumption and sales strategies: The evolution of Mass Retail Trading in Italy, Wine Econ. Policy 4 (2015) 116-127.

[7] M. Platania, S. Platania, G. Santisi, Entertainment marketing, experiential consumption and consumer behavior: The determinant of choice of wine in the store, Wine Econ. Policy 5 (2016) 87-95.

[8] A.M. Corsi, The 9 (+ 1) talking points about the Australian wine retail sector, Wine Viticult. J. (2016) 59-61.

[9] L. Rossetto, L. Galletto, Retail strategies for rosé wines in Italy: A hedonic price analysis, Int. J. Wine Bus. Res. 31 (2019) 282-302.

[10] R. Capitello, L. Agnoli, S. Charters, D. Begalli, Labelling environmental and terroir attributes: Young Italian consumers' wine preferences, J. Clean. Prod. 304 (2021) 126991.

[11] E. Pomarici, M. Lerro, P. Chrysochou, R. Vecchio, A. Krystallis, One size does (obviously not) fit all:

Using product attributes for wine market segmentation, Wine Econ. Policy 6 (2017) 98-106.
[12] G. Pappalardo, G. Chinnici, R. Selvaggi, B. Pecorino, Assessing the Effects of the environment on consumers' evaluations for wine, Wine Econ. Policy 9 (2020) 31-42.
[13] K. Toften, T. Hammervoll, Niche marketing research: Status and challenges, Mark. Intell. Plan. 31 (2013) 272-285.
[14] A. Dominici, F. Boncinelli, F., Gerini, E. Marone, Consumer preference for wine from hand-harvested grapes, Brit. Food J. 122 (2020) 2551-2567.
[15] F. Boncinelli, A. Dominici, F. Gerini, E. Marone, Insights into organic wine consumption: Behaviour, segmentation and attribute non-attendance, Agr. Food Econ. 9 (2021) 1-16.
[16] A. Galati, G. Schifani, M. Crescimanno, G. Migliore, "Natural wine" consumers and interest in label information: An analysis of willingness to pay in a new Italian wine market segment, J. Clean. Prod. 227 (2019) 405-413.
[17] L. Lockshin, W. Jarvis, F. d'Hauteville, J.P. Perrouty, Using simulations from discrete choice experiments to measure consumer sensitivity to brand, region, price, and awards in wine choice, Food Qual. Prefer. 17 (2006) 166-178.
[18] I. Bernetti, L. Casini, N. Marinelli, Wine and globalisation: Changes in the international market structure and the position of Italy, Brit. Food J. 108 (2006) 306-315.
[19] M. Hussain, S. Cholette, R.M. Castaldi, An analysis of globalization forces in the wine industry: implications and recommendations for wineries, J. Glob. Mark. 21 (2008) 33-47.
[20] C. Hawkes, Dietary implications of supermarket development: a global perspective, Dev. Policy Rev. 26(6) (2008) 657-692.
[21] R. Neuninger. The effect of concentration of retail power on the specialist knowledge of retail staff in the food and beverage sector: A case study of wine retail, in: J. Byrom, D. Medway (Eds.), Case Studies in Food Retailing and Distribution, Woodhead Publishing, Cambridge, United States, 2019, pp. 25-36.
[22] E. Pomarici, A. Corsi, S. Mazzarino, R. Sardone, The Italian wine sector: Evolution, structure, competitiveness and future challenges of an enduring leader. Ital. Econ. J. 7 (2021) 259-295.
[23] Gambero Rosso. Esselunga adotta il sommelier virtuale in Gdo. L'intervista a Daniele Colombo, 2020. https://www.gamberorosso.it/notizie/interviste/esselunga-adotta-il-sommelier-virtuale-in-gdo-lintervista-a-daniele-colombo/ (accessed 4 March 2024).
[24] G. Szolnoki, D. Hoffmann, Consumer segmentation based on usage of sales channels in the German wine market. Int. J. Wine Bus. Res. 26 (2014) 27-44.
[25] M.H. Koksal, Segmentation of wine consumers based on level of involvement: a case of Lebanon. Brit. Food J. 123 (2020) 926-942.
[26] L.D. Hollebeek, S.R. Jaeger, R.J Brodie, A. Balemi, The influence of involvement on purchase intention for new world wine, Food Qual. Prefer. 18(2007) 1033-1049.
[27] L. Casini, A. Cavicchi, A.M. Corsi, Trends in the British wine market and consumer confusion, Brit. Food J. 110 (2008) 545-558.
[28] L. Lockshin, S. Mueller, J. Louviere, L. Francis, P. Osidacz, Development of a New Method to Measure How Consumers Choose wine, Aust. NZ. Wine Ind. J. 24 (2009) 37-42
[29] C. Ritchie, The culture of wine buying in the UK off-trade. Int. J. Wine Bus. Res. 21 (2009) 194-211.
[30] C. Mazzocchi, G. Ruggeri, S. Corsi, Consumers' preferences for biodiversity in vineyards: A choice experiment on wine. Wine Econ. Policy 8 (2019) 155-164.
[31] G. Di Vita, F. Caracciolo, F. Brun, M. D'Amico. Picking out a wine: Consumer motivation behind different quality wines choice. Wine Econ. Policy 8 (2019) 16-27.
[32] C. Casalegno, C. Giachino, B. Bertoldi, A New Generation for the Wine Industry. Micro Macro Market. 28 (2019) 49-70.
[33] M.H. Koksal, Differences among baby boomers, Generation X, millennials, and Generation Z wine consumers in Lebanon: Some perspectives. Int. J. Wine Bus. Res 31 (2019) 456-472.
[34] G. Szolnoki, G. Totth, A cross-cultural comparison of wine consumption and purchasing behaviour in Germany and Hungary, Wine Econ. Policy 9 (2020) 19-29.
[35] F. Caracciolo, M. Furno, M., M. D'Amico, G. Califano, G. Di Vita, Variety seeking behavior in the wine domain: A consumers segmentation using big data, Food Qual. Prefer. 97 (2022) 104481.
[36] ISMEA, Dati di sintesi. Chianti. http://www.ismeamercati.it/flex/FixedPages/IT/VinoCertificatoScheda.php/L/IT/ID/30/REG/9/tip/0/col/0/from/-/ 2020a (accessed 30 September 2021).
[37] ISMEA, Dati di sintesi. Montepulciano. https://www.ismeamercati.it/flex/FixedPages/IT/VinoCertificatoScheda.php/L/IT/ID/300/REG/13/tip/0/col/0/from/-/ 2020b (accessed 30 January 2024).

[38] ISMEA, Scheda di settore vino. http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/3525#MenuV/ 2019 (accessed 30 January 2024).
[39] J.F. Hair, W.C. Black, B.J. Babin, R.E. Anderson, Multivariate Data Analysis, Pearson New International ed., Essex, Pearson Education Limited, 2014.
[40] M. Mazzocchi, Statistics for Marketing and Consumer Research, Sage Publications, London, 2008.
[41] T. Caliński, J. Harabasz, A dendrite method for cluster analysis, Commun. Stat. Theory 3 (1974) 1-27.
[42] R.O. Duda, P.E. Hart, Pattern Classification and Scene Analysis (Vol. 3), New York, Wiley, 1973.
[43] R.O. Duda, P.E. Hart, D.G. Stork, Pattern Classification, New York, John Wiley & Sons, 2012.
[44] StataCorp. Stata: Release 15. Statistical Software. College Station, StataCorp LLC., 2017.
[45] Federdoc, V.Q.P.R.D. d'Italia. https://www.federdoc.com/vqprd/ (accessed 10 May 2024).
[46] P. Balestrini, P. Gamble, Country-of-origin effects on Chinese wine consumers, Brit. Food J. 108 (2006) 396-412.
[47] S. Troiano, F. Marangon, T. Tempesta, D. Vecchiato, Organic vs local claims: Substitutes or complements for wine consumers? A marketing analysis with a discrete choice experiment. New Medit 15 (2016) 14-22.
[48] B. Richter, J. Hanf. Competitive strategies for wine cooperatives in the German wine industry. Wine Econ. Policy 9(2) (2020), 83-98.
[49] M. Hirche, S. Loose, L. Lockshin, M. Nenycz-Thiel. Distribution velocity in wine retailing. Wine Econ. Policy 12(2) (2023) 31-41.
[50] S. Sherman, T. Tuten, Message on a bottle: The wine label's influence, Int. J. Wine Bus. Res. 23 (2011) 221-234.
[51] E. Marone, M. Bertocci, F. Boncinelli, N. Marinelli. The cost of making wine: A Tuscan case study based on a full cost approach, Wine Econ. Policy 6 (2017), 88-97.
[52] L. Casini, A.M. Corsi, C. Daniele, N. Marinelli, E. Marone, G. Scozzafava, Full cost analysis and the economic sustainability of the wine sector: The case of Chianti Classico, Econ. Dirit. Agroaliment. 17 (2012), 83-103.
[53] F. Gerini, A. Dominici, L. Casini, The effects of the COVID-19 pandemic on the mass market retailing of wine in Italy, Foods 10 (2021) 2674.
[54] R. Del Rey, S. Loose. State of the international wine market in 2022: new market trends for wines require new strategies. Wine Econ. Policy 12(1) (2023) 3-18.
[55] A. Stasi, G. Nardone, R. Viscecchia, A. Seccia, Italian wine demand and differentiation effect of geographical indications, Int. J. Wine Bus. Res. 23 (2011) 49-61.
[56] G. Scozzafava, F. Gerini, A. Dominici, C. Contini, L. Casini. Reach for the stars: the impact on consumer preferences of introducing a new top-tier typology into a PDO wine. Wine econ. Policy 7(2) (2018) 140-152.

Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Bentivoglio, D., Chiaraluce, G., & Finco, A. (2024). Water stress as a critical issue for Mediterranean viticulture: economic evidence from the Montepulciano d'Abruzzo PDO grape based on a case study in central Italy. *Wine Economics and Policy* 13(1): 141-150. doi: 10.36253/wep-15257

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Water stress as a critical issue for Mediterranean viticulture: economic evidence from the Montepulciano d'Abruzzo PDO grape based on a case study in central Italy

Deborah Bentivoglio, Giulia Chiaraluce*, Adele Finco

Department of Agricultural, Food and Environmental Sciences (D3A), Università Politecnica delle Marche, Italy. Via Brecce Bianche 10, 60131 Ancona, Italy
E-mail: d.bentivoglio@staff.univpm.it; g.chiaraluce@pm.univpm.it; a.finco@univpm.it
*Corresponding author.

Abstract. Climate change has impacted viticulture in almost all of the Mediterranean area, mainly because of temperature rises and changes in precipitation patterns, thus influencing yield, quality, and the management of grape production. One of the measures to mitigate these effects is the adoption of irrigation strategies. This has environmental and economic implications. Thus, it seems essential to evaluate if irrigation is economically and environmentally justified to ensure the sustainability of the vineyard by preserving the water resource. The aim of this research is to compute water-use indicators such as Water Productivity and Economic Water Productivity using field data obtained and to assess the economic impact of supplemental irrigation expenses through the analysis of a single case study. Since the results are heavily influenced by pedoclimatic conditions, vineyard structure, and economic decisions, the generalizability of our findings is not conceivable. However, our findings are valuable in determining when supplemental irrigation is or is not viable. Nonetheless, the findings might shed light on how water is managed in an Italian vineyard. Future supplemental irrigation plans ought to be developed using precision viticulture technologies to monitor the intricate soil-plant-environment system.

Keywords: vineyard, irrigation, climate change, economic analysis, water use indicators.

1. INTRODUCTION

Increasing water scarcity and precipitation variability attributable to climate change pose a major threat to the agriculture sector [1]. According to the Organisation for Economic Co-operation and Development (OECD), the agricultural sector is the largest user of water of any sector globally, accounting for 70% of the total consumption. As in most agricultural sectors, grape and wine production are affected by these changes, and water scarcity is becoming one of the main risks for grape, so wine, production in the Mediterranean area [2]. Although grapevine is a drought-tolerant species, water

availability has impacted viticulture in the last decades [3]. Therefore, the increasing episodes of water scarcity, combined with climate change and the rising temperatures, make viticulture more difficult, forcing the modification of the cultivation practices for grapes to make the vineyards more resilient and sustainable [4-6]. In fact, climate change affects the entire physiology of vines, with strong effects on yield and quality, making it difficult to produce berries of optimal and consistent oenological quality over the forthcoming decades [7]. Currently, some measures of adaptation to climate change that could be taken in highly vulnerable regions are the selection of varieties and rootstocks that are more tolerant to drought and high temperatures, the reduction of the density of plantations, the adaptation of training system, the reduction of canopy changes in soil management practices, and the performance of irrigation with water-efficient training systems [8-11]. Even considering these strategies, adjustments to climate change could be slower for a perennial crop like grapevines, where the twenty-year productive lifetime and the implantation on marginal land restrict mitigation options and increase short-term adaptation costs [12,13]. Although many Mediterranean vineyards are currently cultivated in dry conditions, one of the main measures of adaptation will be the introduction of irrigation, with substantial changes in water management through the implementation of water-saving irrigation strategies, techniques, and technologies to improve efficiency in the use and application of irrigation water [14]. Although the percentage of irrigated land used for vineyards in Europe is less than 10% of the total area, irrigation is becoming more popular to counteract the impacts of climate change and an increasingly hostile environment. As a result, irrigation is growing across France, Spain, Portugal, and Italy's arid regions [15]. In the literature, some studies have already investigated the efficiency of the use of water in viticulture from an agronomic standpoint. Texeira et al. [16] determined the water parameters related to evapotranspiration for wine and table grapes growing under different training and irrigation systems. Salvador and colleagues [17] performed an assessment of seasonal on-farm irrigation performance in the Ebro basin (Spain), considering the differences between crops and irrigation systems and determining the water productivity where yields and production costs were available. Phogat et al. [18] performed an estimation of the water balance and transpiration and evaporation in the case of an irrigated Chardonnay vineyard, as the accurate estimation of water parameters, like evapotranspiration, is fundamental for correct water management. The objective was to calculate the water productivity of grapes for wine production under different deficit irrigation conditions. These works allowed for evaluating the performance and implications of water application in viticulture, assessing its needs, and considering the necessity to minimise and limit water consumption to sustainable levels. However, irrigation is not a marginal adaptation, as it requires substantial investments and changes in practices [19]. In fact, water should be supplied in a sustainable manner, at the right time, in the calibrated quantity, to ensure profitability, quality, and longevity of the production [20]. Thus, economic evaluation is crucial to ensuring that the wine sector remains economically sustainable. The introduction of irrigation as a productive factor in the vineyard will have economic and environmental implications, and it seems essential to evaluate if irrigation is economically and environmentally justified to ensure the sustainability of the vineyard by preserving the water resource both now and in the future [21,22]. As reported by Azorin and Garcia Garcia [14], the conflict between quantity and quality is still driving wine production. Unusual factors, such as water use, may bring higher quality but at the expense of higher management costs. To obtain the best combination of productive and economic indexes and berries' quality, it is fundamental to put in place supportive policies to allow vine growers to invest in suitable and sustainable agronomic practices, also considering the use of supplemental irrigation. Romero et al. [23] reported a similar outcome, with long-term deficit irrigation techniques improving wine quality but at the expense of decreased financial efficiency. Therefore, determining the ideal irrigation water level is essential to developing supplemental irrigation systems that are long-lasting, effective, and financially rewarding. Although the specific circumstances in which grapes are grown have a significant impact, the profitability of irrigation practices is also heavily reliant on the extent of irrigated land, hence water prices. Aparicio et al. [24] stated that a financially successful project requires a minimum area of 1 hectare in the unique situation of Maltese vineyards. A rationalisation of water inputs might be possible with the use of precision viticulture systems, given the current technological capabilities. Bellvert et al. [25] state that, when accounting for net energy and water savings, the use of smart irrigation systems that deliver the appropriate amount of water at the appropriate time may also enable monetary savings of thousands of euros. Finco et al. [22] combined the economic analysis of grape production with two water use efficiency indexes, Water Productivity (WP) and Economic Water Productivity (EWP). Their findings indicate that a lower EWP indicates worse management of the supplemental irrigation, even while a

larger WP implies a stressful condition of the plant that should be considered from a negative point of view depending on which phase the vine is stressed in. However, including the evaluation of different indexes of socio-economic efficiency could support decision-making. The contribution of this article is to evaluate, through the analysis of a case study, the economic impact of supplemental irrigation costs and calculate, using field-collected data on yield values, production costs, water costs, commodity prices and irrigation performance, efficiency, and productivity of irrigation water-use indicators such as WP and EWP. In detail, the analysis concerned Montepulciano d'Abruzzo (Protected Designation of Origin - PDO) grapevine cultivar production for four productive years, from 2018 to 2021, comparing two different training systems: tent roofs and vine rows with the simple Guyot method. Out of the four years that were taken into consideration, supplemental irrigation was only put into place in 2021. This is because the year was marked by unfavourable weather conditions for the vineyards, which were among the hottest in the Mediterranean basin. The wine company in question, aware of the environmental issues that are surfacing, has chosen to invest in precision technologies for real-time water balance monitoring and in a supplemental irrigation system for the vineyard. This is the rationale behind the selection of just one case study. It is important to emphasise that the pedoclimatic conditions, vineyard structure, and company decisions all contribute to the limited generalizability of the results [24]. Indeed, the indexes to assess water use efficiency may vary between regions and countries, making it difficult to compare "companies/farms" performance [20]. On the other hand, this study offers significant proof about the prevalence of irrigation expenses in a particular case. The paper is structured as follows: Section 2 describes the methodology employed in the analysis; Section 3 shows and discusses the main results. Finally, Section 4 concludes.

2. METHODOLOGY

In this section, the selected case study (2.1) and the methodology applied in the economic analysis (2.2) will be described.

2.1. Case study description

The selected case study vineyard is in Abruzzo (Central Italy) (Figure 1).

The cultivated surface is 23 ha with two training systems, tent roof (16.5 ha) and vine rows with simple the Guyot method (6.5 ha), dedicated exclusively to Montepulciano d'Abruzzo grapevine cultivar production under organic and PDO quality schemes (Figure 2).

The density of the vines is 5000 plants/ha in the rows and 1600 plants/ha in the tent roof. Conversely to the tent roof, where the grapes are harvested by hand, the harvesting is done mechanically in the vine rows. Due to climate change, rainfall reduction, and the rise in temperatures, the winery decided to invest in a drip irrigation system to try to maintain a constant production yield. However, during the four years considered in

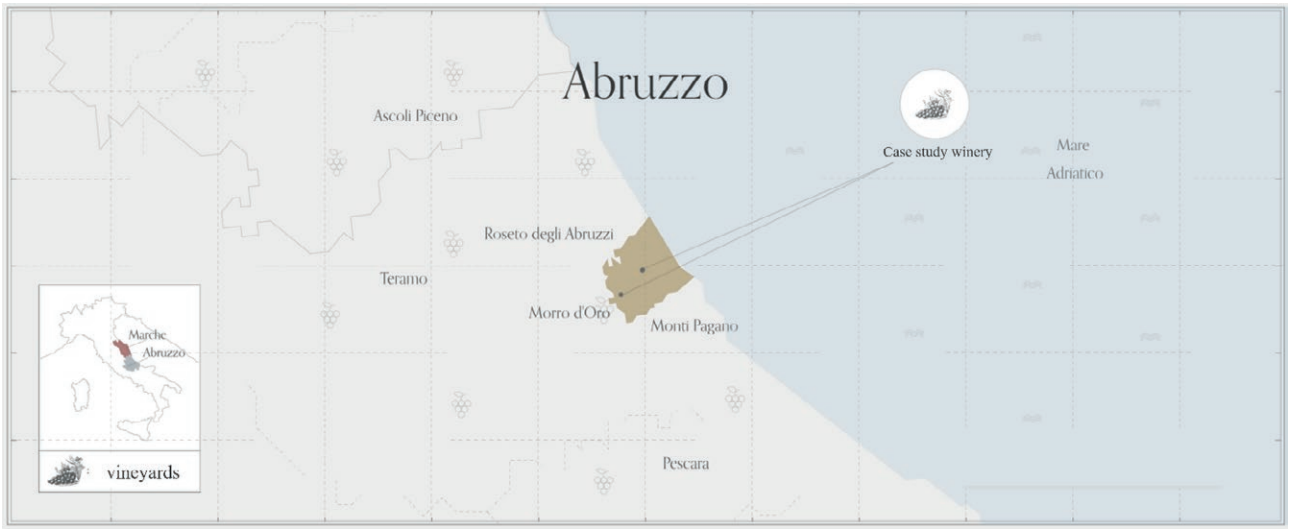


Figure 1. Geographical context of the case study.

Figure 2. Montepulciano grapevine cultivar in Abruzzo: a - vine rows with simple Guyot; b - tent roof.

this study, the winery carried out four supplemental irrigations, two to the *veraison* and two to the fruit set, on the entire area planted with vines only in 2021. Supplemental irrigation is an adaptable measure in current scenarios. The distributed volume of water is 200 m^3/turn.

2.2. Economic analysis

The economic analysis aims to evaluate the impact and incidence of irrigation on the total costs of Montepulciano d'Abruzzo PDO vineyard management. In addition, the costs and returns of various items were used to calculate two water-use indicators, WP and EWP; these indices are considered useful parameters for analysing the economic efficiency of irrigation. For the purpose of the study, the costs of all the cultivation operations carried out in the field, including those related to the irrigation of the vineyards, and the grape yields and prices of four reference years (2018, 2019, 2020, and 2021), were collected with the use of a questionnaire and in-depth interviews with the winery's agronomist. Considering this timeframe, it was possible to compare the costs in the vineyard without (2018, 2019, 2020) and with (2021) irrigation.

The first evaluation was made on variable costs, including the expenses that the company incurs annually for cultivation operations. The number of cultivation operations, as well as the working hours, vary from year to year based on the different seasons. The expense items that make up the variable costs of the winery under study are listed below:

- Pruning
- Branch removal
- Binding
- Green pruning
- Thinning
- Phytosanitary treatments
- Agricultural processing
- Fertilization and weeding
- Harvest
- Vineyard maintenance
- Machine maintenance
- Other
- Irrigation

Each variable cost item is made up internally of the costs for labour and technical means (when required). The irrigation item includes expenses for energy, labour, and maintenance of the drip system (i.e., for the damages caused by hunters).

The fixed costs of the winery include depreciation, administrative and management costs, and overheads. For the drip irrigation system, the fixed costs consist of depreciation and the annual water-providing consortium fee. The turnover, the production trends, and the prices in the four considered years were evaluated to identify the factors affecting the profit and the possible influence of irrigation. The wineries' efficiency structure is explained by two key performance indicators (KPIs): the operating profit margins and the cost-revenue ratio. The first indicator represents how efficiently a company can generate profit through its core operations and is expressed by Equation 1:

$$Operating\ profit\ margin = \frac{operating\ profit}{revenue} \quad (1)$$

where the operating profit corresponds to Earnings Before Interest and Taxes (EBIT).

High operating profit margins show that a company is managing its operating costs well [26]. The second KPI is a measure of efficiency that compares a company's expenses to its earnings (Equation 2):

$$Cost\ revenue\ ratio = \frac{total\ costs}{revenue} \quad (2)$$

A lower cost-revenue ratio means that a company can produce more using fewer resources.

Finally, the data collected for the cost analysis were also useful to estimate the WP and EWP for the assessment of water use efficiency. The concept of WP was introduced by Molden in 1997 [27] to support water-related studies, helping identify opportunities for water saving. Productivity, in general, is a ratio referring to the unit of output per unit of input, but depending on how the terms in the numerator and denominator are expressed, WP can be expressed both in physical and economic terms [28]. The water productivity is expressed as the ratio between the crop productive yield and the actual evapotranspiration (Et) (Equation 3):

$$WP = \frac{yield\ (kg\ ha^{-1})}{Et\ (m^3 ha^{-1})} \quad (3)$$

Generally, the estimation of Et is not easy to achieve, but an accurate evaluation is essential for WP definition. For the scope of the study, the Et values were retrieved from an experimental smart platform that collects data from remote and non-remote sensors in real time with a site-specific approach. The Et is determined by a combination of several factors, like environmental conditions, plant canopy size, and water stress. However, it is worth remembering that an improvement in WP does not necessarily lead to water savings. A better management of the water resource is fundamental not only for environmental sustainability but also for the economic sustainability [29]. The water productivity approach alone is not enough to identify the best option for irrigation; hence, economic profit must be considered [30]. Indeed, replacing the numerator of Equation 3 with the profit, the EWP is defined by Equation 4:

$$EWP = \frac{Profit\ (€\ ha^{-1})}{Et\ (m^3 ha^{-1})} \quad (4)$$

In this specific case, the profit is given by summing the gross income (yield multiplied for the market price) with the European contributions (deriving from the Common Agricultural Policy and the organic certification) minus variable and fixed costs (Equation 5):

$$Profit = ((Y*Pr)+E-V-F) \quad (5)$$

Y = Yield (kg/ha)
Pr = Grape market price (€/kg)
E = European funds (CAP and organic) (€/ha)
V = Variable costs (€/ha)
C = Fixed costs (€/ha)

EWP is particularly useful to take decisions on how to manage irrigation in the most profitable way. A precise calculation of EWP, however, can be made only at the end of the season, when the revenue and costs are known. It is, however, important to note that the EWP is very sensitive to market prices, which may vary and lead to a substantial increase in production due to market and supply-demand economics. A negative value of EWP means that the costs of production exceed the benefits of production [31].

3. RESULTS AND DISCUSSION

Costs and profits for each season and for the two training systems, including irrigation costs, are shown in Table 1. The variable costs include human labour and the input costs (when required). The machineries costs are included in depreciation and other costs (fixed costs). Supplemental irrigation was performed only in 2021 with four interventions, distributing 800 m^3/ha in total on all the surface (23 ha).

In detail, Table 1 shows that in the tent roof the total variable costs are always higher than those in the simple Guyot (+ 42% on average). In detail, in the tent roof, the cost items that influence the more the variable costs are the green pruning (on average 26%), the harvest (on average 21%), the branch removal (on average +12%), and the phytosanitary treatments (on average 11%). Instead, in the Guyot method, the main variable cost items are the mechanical harvest (on average 19%), the green pruning (on average 15%), the phytosanitary treatments (on average 14%), and the vineyard maintenance (on average +12%). The training system (tent roof vs. Guyot) and the input availability seem to have an impact on the production costs. Appropriate agronomic practices, such as water management and cultivation techniques, may bring higher costs, especially due to the intensification of plant protection treatments, but they may reduce the negative impacts on yields [32].

Concerning the variable costs of irrigation, these are only present in 2021 and correspond to 160.00 €/ha for both management methods. These costs include expenses for energy (40.00 €/ha), labour (20.00 €/ha),

Table 1. Costs for Montepulciano d'Abruzzo grape production in 2018, 2019, 2020, and 2021(€/ha).

	2018		2019		2020		2021	
	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row
Variable Costs	*9,260.07*	*6,543.65*	*8,952.39*	*6,117.49*	*9,130.46*	*6,163.69*	*10,563.06*	*7,816.26*
Pruning	232.52	220.61	313.67	297.61	234.24	222.25	269.38	272.57
Branch removal	1,186.53	750.53	895.77	566.61	1,140.95	721.69	1,035.75	698.94
Binding	364.89	351.13	169.21	160.55	334.96	317.82	299.38	302.92
Green pruning	2,018.42	820.75	2,417.27	982.94	2,417.27	982.94	2,597.00	1,126.20
Thinning	362.01	343.48	0.00	0.00	282.59	268.12	171.25	173.28
Phytosanitary treatments	907.68	838.85	1,073.55	967.62	1,071.65	966.14	987.75	921.58
Agricultural processing	598.91	464.93	808.46	627.60	793.90	616.30	867.63	718.29
Fertilization and weeding	589.97	513.92	591.87	515.39	503.24	446.59	679.69	605.73
Harvest	1,916.55	1,212.29	1,726.62	1,092.15	1,926.91	1,218.84	2,075.25	1,399.91
Vineyard maintenance	903.02	856.79	865.61	821.30	260.72	247.37	1,296.88	1,312.25
Machine maintenance	37.99	36.04	33.96	32.22	50.07	47.51	52.50	53.12
Other	141.58	134.33	56.40	53.52	113.96	108.12	70.63	71.46
Irrigation	0.00	0.00	0.00	0.00	0.00	0.00	160.00	160.00
Fixed Costs	*2,550.00*		*2,550.00*		*2,550.00*		*2,550.00*	
Depreciation	1,000.00		1,000.00		1,000.00		1,000.00	
Administration and management	150.00		150.00		150.00		150.00	
Overheads	800.00		800.00		800.00		800.00	
Irrigation	600.00		600.00		600.00		600.00	
Total costs	11,810.07	9,093.65	11,502.39	8,667.49	11,680.46	8,713.69	13,113.06	10,366.26

and maintenance (100.00 €/ha) of the drip system. It also emerges that, in the tent roof, the variable irrigation costs weigh 1.2%, while in Guyot 1.5%.

As reiterated in the previous paragraph, fixed costs of the winery include, for both methods of production, depreciation, administrative and management costs, and overheads, and correspond to 2,550.00 €/ha.

The fixed costs of irrigation make up about 24% of the total fixed costs, and they include depreciation (200.00 €/ha) and the consortium fee (400.00 €/ha). The consortium fee represents both an advantage and a disadvantage for the company. Indeed, if the entrepreneur decides not to irrigate, it must continue to sustain this cost; however, the annual fee guarantees the producer continuous access to the water resource without bothering with the actual amount used. In summary, irrigation accounts for 6–7% of the total cost of cultivation, depending on the training system. This outcome is consistent with published research [22,33].

Table 2 shows the returns deriving from the sale of the grapes at the market price set by the winery and the European contribution for organic production.

Firstly, from the analysis of the yields, it emerges that there is a consistent difference between the two-training method, and in the tent roof the yield is always higher. It is notable that, from 2018 to 2020, which are the years without irrigation, there is a continuous decrease in the yield value for all the training systems. This is particularly emphasised in the vine rows, where, for company policy, the winery is aiming at a reduction in quantity in favour of quality, as explained during the interview with the technician. On the other hand, in 2021, there has been an increase in the production quantity, especially in the tent roof. This positive result could be linked to the irrigation but also to a set of beneficial climate conditions, as declared by the agronomist of the winery [34]. Secondly, the ability of the winery company to fetch higher prices over the years, thanks to the quality policy, allowed for obtaining consistent returns [14]. In fact, increasing quantity obtained alone will not ensure higher profitability of production due to irrigation solely.

In summary, Table 3 shows the aggregates of the economic analysis and of the KPIs.

With the market prices, yield, and costs considered in this study, the vineyard generates a profit except for the vine rows in 2021. This negative value can be explained not only with the introduction of irrigation but also with an increase in variable costs relating to vineyard maintenance (+430% compared to 2020) com-

Table 2. Vineyard returns.

	2018		2019		2020		2021	
	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row
Yield (100 kg/ha)	180.00	133.00	146.00	97.50	130.50	77.00	159.00	78.00
Grape price (€/100 kg)	86.00	86.00	102.00	102.00	105.00	105.00	110.00	110.00
Gross production (€/ha)	15,480.00	11,438.00	14,892.00	9,945.00	13,702.50	8,085.00	17,490.00	8,580.00
European funds (organic and CAP) (€/ha)	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Total (€/ha)	16,280.00	12,238.00	15,692.00	10,745.00	14,502.50	8,885.00	18,290.00	9,380.00

Table 3. The economic costs and returns (€/ha) and the KPIs for Montepulciano d'Abruzzo grape production in the four years of the analysis.

	2018		2019		2020		2021	
	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row	Tent roof	Vine row
Total variable costs	9,260.07	6,543.65	8,952.39	6,117.49	9,130.46	6,163.69	10,563.06	7,816.26
Total fixed costs	2,550.00	2,550.00	2,550.00	2,550.00	2,550.00	2,550.00	2,550.00	2,550.00
Total costs	11,810.07	9,093.65	11,502.39	8,667.49	11,680.46	8,713.69	13,113.06	10,366.26
Returns	16,280.00	12,238.00	15,692.00	10,745.00	14,502.50	8,885.00	18,290.00	9,380.00
Profit/loss	4,469.93	3,144.35	4,189.61	2,077.51	2,822.04	171.31	5,176.94	-986.26
Operating margin	0.24	0.20	0.23	0.13	0.15	-0.08	0.26	-0.19
Cost revenue ratio	0.76	0.80	0.77	0.87	0.85	1.08	0.74	1.19

bined with a yield that, although increasing, is lower than in previous years. On the other hand, the irrigation practice has contributed to an increase in profit in the case of the tent roof (+84% compared to 2020). Regarding the first KPY, the operating profit margin, it emerged that, on the tent roof, this index is always higher with respect to the vine row. Thus, high operating profit margins show that a company is managing its operating costs well in this training system. This is remarked by the cost-revenue ratio that, in the vine row, is higher. As a result, the low value recorded on the tent roof indicates that the system is more efficient in managing costs and generating more money.

Finally, to assess the efficiency of water management by the vineyard, WP and EWP were calculated (Table 4).

Starting from the analysis of the WP, it emerges that, in both forms of training, the values of this index are higher in non-irrigated years than in the irrigated year. Since a high WP value indicates a more stressed plant [35], it is possible to declare that supplementary irrigation, combined with efficient vineyard management, has led to a better physiological state of the plant. It is also notable that the tent roof has always had higher WP values than the vine rows. This can be explained by the different policies adopted by the winery, which aim to achieve higher yields on the tent roof while maintaining a better quality in the vine rows.

Table 4. Water use indicators.

	WP (kg/m^3)		EWP (€/m^3)	
	Tent roof	Vine rows	Tent roof	Vine rows
2018	15.74	11.63	3.91	3.49
2019	13.95	9.32	4.00	2.80
2020	14.64	8.64	3.17	1.15
2021	12.59	6.18	4.10	-0.78

Even the EWP values are always higher in the tent roof than in the vine rows, showing that the tent roof is more cost-efficient. In addition, EWP for 2021 is higher than the average value of the not-irrigated period, thus confirming the correct choice to use supplementary irrigation. Nonetheless, it is evident how the negative revenues registered in the row led to a negative index, and this demonstrates how the management of this system did not lead to a yield sufficient to cover the costs, as in the case of the tent roof. However, it is important to note that market processes, which vary largely, are very determining for the value of the EWP [36].

4. CONCLUSION

The effects of climate change on viticulture are difficult to quantify. This is because we do not know the frequency and intensity with which these phenomena will occur over time and how they will stabilize. Consequently, it is difficult even to predict the reaction of natural ecosystems and agroecosystems to change. The necessity to adopt irrigation of crops like vines, traditionally managed without water supplies, is due, on the one hand, to climate change and a reduction in rainfall, and, on the other, to the need to address production towards quality products. The key to improving the quality of the grapes is the achievement of a vegetative-productive balance through careful and rational management of resources, mainly water. Sustainable water management in viticulture aims to match water availability and water needs in quantity and quality, in space and time, at reasonable costs, and with acceptable environmental impacts. Supplementary irrigation in the vineyard could be considered a tool for improving production and reducing water stress. However, supplemental irrigation strategies should be based on the precise monitoring of atmospheric conditions, temperatures, soil characteristics, and plant water status. For this purpose, the implementation of precision viticulture technologies could be a solution and a decision-making support system [25]. The interaction between monitoring sensors to check the plant parameters and the intelligent irrigation system could be a starting point to guarantee that water is provided only when the vine requires it, in a sufficient amount, for a determined timespan, and in a specific growth phase, to ensure a profitable and high-quality yield and prolong the life of the vineyard. This should ensure that the plants are not subjected to excessive stress [37]. Climate change affects not only the yields of the grape, so the quantity of wine produced, but also the prices, thus the profit coming from the vineyard.

Our findings suggest that correct water management, combined with vineyard management, could positively influence the physiological state of the vine, leading to improved and constant quality. Indeed, the application of adaptation strategies to tackle climate change is essential to guaranteeing the resilience of the agricultural productive sector.

This study is not without limitations. It would be interesting to compare more subsequent irrigated years to understand if water consistently impacts costs, profitability, and yields. In fact, according to our findings, irrigation is not economically advantageous for the winery under consideration. However, the use of water for supplemental irrigation should be considered under the light of the fact that, with the use of water, the winery was able to maintain a high yield even during one of the hottest recent years. In this sense, water use at a certain cost may be justified to guarantee a quality product. This aspect, combined with a substantial price of grapes sold, allowed the winery to limit the loss in 2021. Water resource management that is meticulous and heavily reliant on precision technologies has the potential to optimise irrigation operations and enhance input management, which in turn can lower production costs and improve product quality. This would be useful for programming agricultural activities throughout the years. Secondly, it would be desirable to extend the concept of this study to other Italian regions to understand if there is the same struggle with water supply and propose strategies to face this problem. Our study lacks generalizability due to the different managerial choices of wineries as well as the different pedoclimatic conditions under which production occurs. However, knowledge of water use efficiency indexes may represent a good starting point for obtaining objective parameters for comparison. Therefore, our results should be considered only as a springboard for future research. Future studies could investigate different training systems and their approaches to water use in viticulture.

ACKNOWLEDGEMENT

The authors wish to thank the winery Umani Ronchi for providing data and support to the research.

REFERENCES

[1] R. Zucaro, A. Pontrandolfi, Agricoltura irrigua e scenari di cambiamento climatico. Stagione irrigua 2006 nel Centro Nord, Istituto Nazionale di Economia Agraria, 2007. https://sigrian.crea.gov.it/wp-content/uploads/2020/11/2007_Rapporto_Irrigazione_camb_climatici_2006.pdf (accessed on 17 January 2023).

[2] J.M. Costa, M. Vaz, J. Escalona, R. Egipto, C. Lopes, H. Medrano, M.M. Chaves, Modern viticulture in southern Europe: Vulnerabilities and strategies for adaptation to water scarcity, Agr. Water Manage. 164 (2016) 5-18. https://doi.org/10.1016/j.agwat.2015.08.021

[3] J.M. Mirás-Avalos, E.S. Araujo, Optimization of vineyard water management: Challenges, strategies, and perspectives. Water, 13(6) (2021) 746. https://doi.org/10.3390/w13060746

[4] L.C. Carvalho, M.J. Ramos, D. Faísca-Silva, D. van der Kellen, J.C. Fernandes, R. Egipto, C.M. Lopes, S. Amâncio, Developmental Regulation of Transcription in Touriga Nacional Berries under Deficit Irrigation, Plants 11(6) (2022) 827. https://doi.org/10.3390/plants11060827

[5] M.R. Mozell, L. Thach, The impact of climate change on the global wine industry: Challenges & solutions, Wine Econ. Policy, 3(2) (2014) 81-89. https://doi.org/10.1016/j.wep.2014.08.001

[6] I. Bernetti, S., Menghini, N., Marinelli, S., Sacchelli, V.A. Sottini, Assessment of climate change impact on viticulture: economic evaluations and adaptation strategies analysis for the Tuscan wine sector. Wine Econ. Policy, 1(1) (2012) 73-86. https://doi.org/10.1016/j.wep.2012.11.002

[7] S. Dal Santo, A. Palliotti, S. Zenoni, G.B. Tornielli, M. Fasoli, P. Paci, … M. Pezzotti, Distinct transcriptome responses to water limitation in isohydric and anisohydric grapevine cultivars, BMC genomics, 17(1) (2016) 1-19. https://doi.org/10.1186/s12864-016-3136-x

[8] M.C. Antolín, E. Salinas, A. Fernández, Y. Gogorcena, I. Pascual, J.J. Irigoyen, N. Goicoechea, Prospecting the Resilience of Several Spanish Ancient Varieties of Red Grape under Climate Change Scenarios, Plants, 11(21) (2022) 2929. https://doi.org/10.3390/plants11212929

[9] A. Naulleau, C. Gary, L. Prévot, F. Vinatier, L. Hossard, How can winegrowers adapt to climate change? A participatory modeling approach in southern France, Agr. Syst., 203 (2022) 103514. https://doi.org/10.1016/j.agsy.2022.103514

[10] T. Frioni, E. Romanini, S. Pagani, F. Del Zozzo, M. Lambri, A. Vercesi, … & M. Gabrielli, Reintroducing Autochthonous Minor Grapevine Varieties to Improve Wine Quality and Viticulture Sustainability in a Climate Change Scenario. Aust. J. Grape Wine R., (2023). https://doi.org/10.1155/2023/1482548

[11] F., Del Zozzo, S., Poni, Climate Change Affects Choice and Management of Training Systems in the Grapevine, Aust. J. Grape Wine R., (2024). https://doi.org/10.1155/2024/7834357

[12] O. Ashenfelter, K. Storchmann, Wine and climate change, AAWE Working Paper, (2014) 152. https://ageconsearch.umn.edu/record/164854/ (accessed on 17 January 2023).

[13] S. Candar, İ. Korkutal, E. Bahar, Changes of Vine Water Status and Growth Parameters Under Different Canopy Managements on cv. Merlot (Vitis vinifera L.), Tekirdağ Ziraat Fakültesi Dergisi, 19(1) (2022) 1-15. https://doi.org/10.33462/jotaf.795232

[14] P. Romero Azorin, J. Garcia Garcia, The Productive, economic, and social efficiency of vineyards using combined drought-tolerant rootstocks and efficient low water volume deficit irrigation techniques under Mediterranean semiarid conditions, Sustainability, 12(5) (2020) 1930. https://doi.org/10.3390/su12051930

[15] J.M. Costa, M. Vaz, J. Escalona, R. Egipto, C. Lopes, H. Medrano, M.M. Chaves, Modern viticulture in southern Europe: Vulnerabilities and strategies for adaptation to water scarcity, Agr. Water Manage., 164 (2016) 5-18. https://doi.org/10.1016/j.agwat.2015.08.021

[16] A.D.C. Teixeira, W.G.M. Bastiaanssen, L.H. Bassoi, Crop water parameters of irrigated wine and table grapes to support water productivity analysis in the Sao Francisco river basin, Brazil, Agr. Water Manage., 94(1-3) (2007) 31-42. https://doi.org/10.1016/j.agwat.2007.08.001

[17] R. Salvador, A. Martínez-Cob, J. Cavero, J. E. Playán, Seasonal on-farm irrigation performance in the Ebro basin (Spain): Crops and irrigation systems, Agr. Water Manage., 98(4) (2011) 577-587. https://doi.org/10.1016/j.agwat.2010.10.003

[18] V. Phogat, M.A. Skewes, M.G. McCarthy, J.W. Cox, J. Šimůnek, P.R. Petrie, Evaluation of crop coefficients, water productivity, and water balance components for wine grapes irrigated at different deficit levels by a sub-surface drip, Agr. Water Manage., 180 (2017) 22-34. https://doi.org/10.1016/j.agwat.2016.10.016

[19] N. Graveline, M. Grémont, The role of perceptions, goals and characteristics of wine growers on irrigation adoption in the context of climate change, Agr. Water Manage., 250 (2021) 106837. https://doi.org/10.1016/j.agwat.2021.106837

[20] J.M. Costa, M., Oliveira, R.J. Egipto, J.F. Cid, R.A. Fragoso, C.M. Lopes, E.N. Duarte, Water and Wastewater management for sustainable viticulture and oenology in south Portugal–A review, Ciência e técnica vitivinícola, 35(1) (2020) 1-15. https://doi.org/10.1051/ctv/20203501001

[21] E. Pomarici, A. Seccia, Economic and Social Impacts of Climate Change on Wine Production, Ref. Modul. Food Sci., 2(1) (2016) 1-8. 10.1016/B978-0-08-100596-5.03062-6

[22] A. Finco, D. Bentivoglio, G. Chiaraluce, M. Alberi, E. Chiarelli, A. Maino, A., … G. Bucci, Combining Precision Viticulture Technologies and Economic Indices to Sustainable Water Use Management, Water, 14(9) (2022) 1493. https://doi.org/10.3390/w14091493

[23] P. Romero, J.G. García, J.I. Fernández-Fernández, R.G. Muñoz, F. del Amor Saavedra, A. Martínez-Cutillas, Improving berry and wine quality attributes and vineyard economic efficiency by long-term deficit irrigation practices under semiarid conditions. Sci. hortic., 203 (2016) 69-85. https://doi.org/10.1016/j.scienta.2016.03.013

[24] J. Aparicio, A.J. Tenza-Abril, M. Borg, J. Galea, L. Candela, Agricultural irrigation of vine crops from desalinated and brackish groundwater under an economic perspective. A case study in Siġġiewi, Malta, Sci. tot. environ., 650 (2019) 734-740. https://doi.org/10.1016/j.scitotenv.2018.09.059

[25] J. Bellvert, M. Mata, X. Vallverdú, C. Paris, J. Marsal, Optimizing precision irrigation of a vineyard to improve water use efficiency and profitability by using a decision-oriented vine water consumption model, Precis. Agric., 22(2) (2021) 319-341. https://doi.org/10.1007/s11119-020-09718-2.

[26] B. Marr, Key Performance Indicators (KPI): The 75 measures every manager needs to know, first ed., Pearson, UK, 2012.

[27] D. Molden, Accounting for water use and productivity, International Water Management Institute, Colombo, Srilanka, 1997.

[28] N. Heydari, Water productivity in agriculture: challenges in concepts, terms and values, Irrig. Drain., 63(1) (2014) 22-28. https://doi.org/10.1002/ird.1816.

[29] G.C. Rodrigues, L.S. Pereira, Assessing economic impacts of deficit irrigation as related to water productivity and water costs, Biosyst. Eng., 103(4) (2009) 536-551. https://doi.org/10.1016/j.biosystemseng.2009.05.002

[30] T. Zhang, Y. Zou, I. Kisekka, A. Biswas, H. Cai, Comparison of different irrigation methods to synergistically improve maize's yield, water productivity and economic benefits in an arid irrigation area, Agr. Water Manage., 243 (2021) 106497. https://doi.org/10.1016/j.agwat.2020.106497

[31] J.E. Fernández, F. Alcon, A. Diaz-Espejo, V. Hernandez-Santana, M.V. Cuevas, Water use indicators and economic analysis for on-farm irrigation decision: A case study of a super high density olive tree orchard, Agr. Water Manage., 237 (2020) 106074. https://doi.org/10.1016/j.agwat.2020.106074.

[32] E. Merloni, L. Camanzi, L. Mulazzani, G. Malorgio, Adaptive capacity to climate change in the wine industry: A Bayesian Network approach, Wine Econ. Policy, 7(2) (2018) 165-177. https://doi.org/10.1016/j.wep.2018.11.002

[33] C. Corradi, Irrigare il frutteto e il vigneto - Sistemi e impianti, first ed., Edagricole, Milano, 2020.

[34] J. Alvarez Arredondo, J. Muñoz, L.F. Casassa, J.C. Dodson Peterson, The Effect of Supplemental Irrigation on a Dry-Farmed Vitis vinifera L. cv. Zinfandel Vineyard as a Function of Vine Age, Agronomy, 13(8) (2023) 1998. https://doi.org/10.3390/agronomy13081998

[35] L.S. Pereira, Relating water productivity and crop evapotranspiration. 4th WASAMED (WAter SAving in MEDiterranean Agriculture) Workshop on Water Use Efficiency and Water Productivity, (2007) Amman, Jordan.

[36] P.J.G.J. Hellegers, R. Soppe, C.J. Perry, W.G.M. Bastiaanssen, Combining remote sensing and economic analysis to support decisions that affect water productivity, Irrigation Sci., 27(3) (2019) 243-251. https://doi.org/10.1007/s00271-008-0139-7.

[37] L. Paleari, L. Brancadoro, C. Rusconi, E. Movedi, S. Poni, M. Bolognini, … & R. Confalonieri, Quantifying water stress in vineyards using a smartphone, Biosyst. Eng., 238 (2024) 89-93. https://doi.org/10.1016/j.biosyst

Finito di stampare da
Logo s.r.l. – Borgoricco (PD) – Italia

WEP
Wine Economics and Policy

Table of contents